

Sapphire HD6970
2GB BFBC2 VGE

OCZ
RevoDrive X2

Zalman N-Series
128GB SSD



cpu

COMPUTER POWER USER

HYPERX
MAX 3.0
256GB

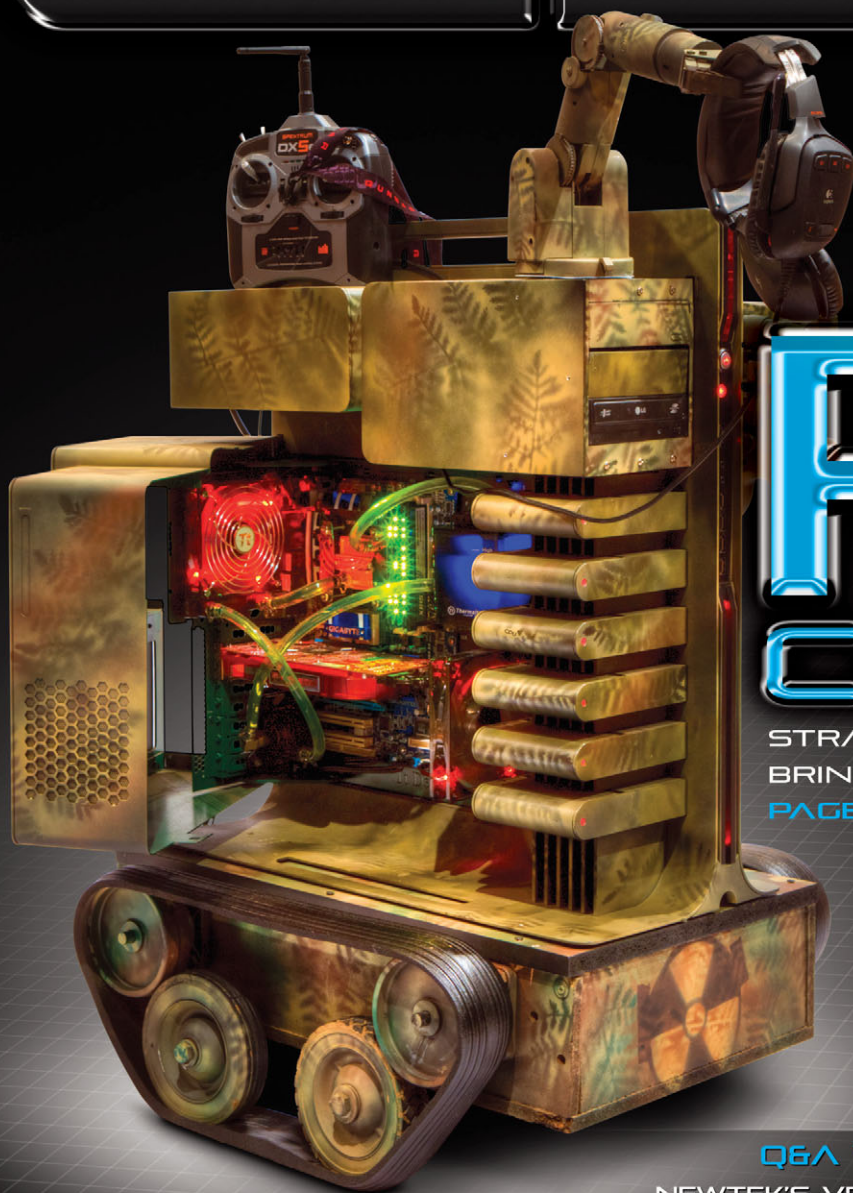
Kingston

KINGSTON HYPERX MAX 3.0
PAGE 17

SIX TRIPLE-CHANNEL DDR3 KITS
DUKE IT OUT FOR YOUR AMUSEMENT
PAGE 26

SF-2000: SANDFORCE'S NEXT
CONTROLLER & WHY YOU WILL WANT IT
PAGE 52

THE A(MD)-TEAM: AMD
MOTHERBOARD ROUNDUP
PAGE 22



PC COOLING

STRATEGIES, TIPS & PRODUCTS TO
BRING YOUR SYSTEM'S TEMPS DOWN
PAGE 58

WOULD YOU LIKE
TO PLAY A GAME?
ROG-R WOULD.
PAGE 48

Q&A WITH ROB POWERS
NEWTEK'S VP OF 3D DEVELOPMENT
MAKES A SCENE
PAGE 110



Gamer Paladin D815

- Intel® Core™ i3-540 Processor
- Genuine Windows® 7 Home Premium 64-Bit Edition
- ASUS® P7H55 Motherboard
- NVIDIA® GeForce™ GT 430 1GB Video Card - DirectX 11 Support
- PSI CyborgX Gaming Case + 450W Power Supply
- Liquid CPU Cooling System with 120mm Radiator
- High Definition Surround 3D Premium Sound
- Optional: NVIDIA® 3D Vision Glasses and Monitor (+\$499)



Components included with system

\$629



• Intel® Core™ i7-880 Processor	\$1149
• Intel® Core™ i7-875K Processor	\$864
• Intel® Core™ i7-870 Processor	\$824
• Intel® Core™ i5-760 Processor	\$729
• Intel® Core™ i5-680 Processor	\$824
• Intel® Core™ i5-660 Processor	\$724
• Intel® Core™ i5-655K Processor	\$729
• Intel® Core™ i5-650 Processor	\$699
• Intel® Core™ i3-540 Processor	\$629

• Intel® Core™ i7-880 Processor	\$1329
• Intel® Core™ i7-875K Processor	\$1044
• Intel® Core™ i7-870 Processor	\$1009
• Intel® Core™ i5-760 Processor	\$914
• Intel® Core™ i5-680 Processor	\$999
• Intel® Core™ i5-660 Processor	\$899
• Intel® Core™ i5-655K Processor	\$909
• Intel® Core™ i5-650 Processor	\$879
• Intel® Core™ i3-540 Processor	\$799



\$799

LAN Warrior II-55

- Intel® Core™ i3-540 Processor
- Genuine Windows® 7 Home Premium 64-Bit Edition
- Gigabyte H55M-USB3 Motherboard
- NVIDIA® GeForce™ GTX460 2GB Video Card - DirectX 11 Support
- NZXT® Vulcan Gaming Case + 700W Certified Power Supply
- High Definition Surround 3D Premium Sound
- Optional: NVIDIA® 3D Vision Glasses and Monitor (+\$499)



Components included with system

Gamer Paladin D855

- Intel® Core™ i7-950 Processor
- Genuine Windows® 7 Home Premium 64-Bit Edition
- Intel® X58 Chipset Motherboard with USB 3.0 Card
- NVIDIA® GeForce™ GTS 450 1GB Video Card
- NZXT® Guardian 921RB Gaming Case + 700W Power Supply
- Liquid CPU Cooling System with 120mm Radiator
- High Definition Surround 3D Premium Sound
- Optional: NVIDIA® 3D Vision Glasses and Monitor (+\$499)



Components included with system

\$984



• Intel® Core™ i7-980X Processor Extreme Edition	\$1819
• Intel® Core™ i7-970 Processor	\$1629
• Intel® Core™ i7-960 Processor	\$1299
• Intel® Core™ i7-950 Processor	\$984

Gamer Paladin D895

- Intel® Core™ i7-950 Processor
- Genuine Windows® 7 Home Premium 64-Bit Edition
- ASUS® Sabertooth X58, USB3 + SATA3 Motherboard
- NVIDIA® GeForce™ GTX480 1536MB Video Card - DirectX 11 Support
- Antec Nine Hundred Two Gaming Case + 800W Power Supply
- Intel® 40GB SSD (Boot) + 2TB SATA3 HDD (Data)
- Liquid CPU Cooling System with 120mm Radiator
- High Definition Surround 3D Premium Sound
- Optional: NVIDIA® 3D Vision Glasses and Monitor (+\$499)



Components included with system

\$1879



Gamer Paladin D875

- Intel® Core™ i7-950 Processor
- Genuine Windows® 7 Home Premium 64-Bit Edition
- ASUS® Sabertooth X58, USB3 + SATA3 Motherboard
- ATI® Radeon™ HD 5770 1GB Video Card - DirectX 11 Support
- Antec DF-35 Gaming Case + 700W Power Supply
- Kingston® 30GB SSD (Boot) + 1TB SATA3 HDD (Data)
- Liquid CPU Cooling System with 120mm Radiator
- High Definition Surround 3D Premium Sound



Components included with system

\$1199



• Intel® Core™ i7-980X Processor Extreme Edition	\$2639
• Intel® Core™ i7-970 Processor	\$2499
• Intel® Core™ i7-960 Processor	\$2174
• Intel® Core™ i7-950 Processor	\$1879

Toll Free: 888-462-3899 | www.ibuypower.com

Intel, the Intel logo, Intel Core and Core Inside are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. All content and prices are subject to change without notice or obligation.

iBUYPOWER Recommends Windows® 7 Home Premium

GRAB YOUR GEAR Prepare for Battle



\$1049

- Intel® Core™ i7-840QM Processor \$1399
- Intel® Core™ i7-740QM Processor \$1189
- Intel® Core™ i7-640M Processor \$1159
- Intel® Core™ i5-580M Processor \$1069
- Intel® Core™ i5-560M Processor \$1049

Battalion Touch CZ-11

- Intel® Core™ i5-560M Processor Technology
- Intel® PM55 Chipset
- Intel® WiFi Link 5300 Wireless 802.11 a/b/g/n
- GENUINE Windows® 7 Home Premium 64-Bit Edition
- 15.6" FHD 1920x1080 Touch Screen Display
- 4GB DDR3-1333 Memory
- 500GB S-ATA Hard Drive
- ATI® Radeon™ HD 5650 1GB Video Card
- Removable 8x DVD±R/±RW Drive
- Built-in 2.0 Mega Pixels Digital Camera



MAGIC
MULTI-TOUCH ADVANCED GAMING
INTERFACE & CONTROL

Introducing the World's First Full HD Multi-Touch Gaming Notebook



Toll Free: 888-462-3899



www.ibuypower.com

CUSTOMIZABLE MINI PC

ZBOX

SUBMERGE INTO A NEW DIMENSION



ZBOX-ID36BR3D
BAREBONE

ZBOX-ID36BR3D-PLUS
INCLUDES HDD + RAM

fray's
ELECTRONICS

TigerDirect.com



Blu-ray 3D

Submerge yourself with stunning
high-definition 1080p **Blu-ray 3D** video
playback powered by **Intel Atom D525** chipset
and Next-Generation **NVIDIA® ION™** technology.



ZOTAC®
WWW.ZOTACUSA.COM

MICRO CENTER
computers & electronics

shop smart, shop mwave!
mwave 



amazon.com.

PC COOLING

SPOTLIGHT

58 **Mercury Falling**

A Comprehensive Guide To
Tackling Temps

66 **What Type Of Watercooler Are You?**

We Break Down Your Liquid
Refreshment Options

62 **Establish Some Cool**

Map Out Your Thermal Plan Of Attack

70 **Frozen Assets**

CPU's Cooling Gear Buying Guide

Frontside

- 10 What's Happening
- 20 Digital Economy
- 21 Dream Hardware

Heavy Gear

- 22 **An IGP For All Seasons**
AMD 890GX & 880G
Motherboards Enter The Octagon
- 26 **Memory Gain**
Core i7 RAM Comes In Threes
- 30 Logitech Revue
Buffalo Ministation Cobalt USB 3.0
- 32 Nvidia GeForce GTX 570
AMD Radeon HD 6950

- 34 OCZ RevoDrive X2 240GB
ViewSonic VOT125-4 PC Mini
- 36 **Sapphire HD6970 2GB**
GDDR5 BFBC2 VGE
AMD's New Flagship GPU
Shakes Things Up
- 37 AMD Phenom II X6 1100T
Black Edition
Zotac GeForce GTX 460 AMP!
- 38 Thermaltake Challenger Pro
Wacom Intuos4 Medium
- 40 Zalman N-Series 128GB SSD
Zalman Z9 Plus
- 41 NorthwestWare Elite
DARWINmachine
Hammerhead HMR989

- 42 Corsair HS1 USB
Gaming Headset
PowerColor PCS+ HD6870
1GB GDDR5

Featured On The Cover

17 **Kingston HyperX MAX 3.0**



ASSASSIN'S CREED BROTHERHOOD

page 97



Hard Hat Area

PC Modder

- 44 **Modded Mobility**
Overhaul A Notebook For
Insane Performance
- 48 **Mad Reader Mod**
Rog-R
- 50 **Advanced Q&A Corner**
- 52 **White Paper: SandForce SF-2000**
New Family Of SSD Processors
Promises Impressive Performance

Infinite Loops

Strange stats and other oddball
items from computing's periphery.
101



Loading Zone

- 75 **The Bleeding Edge Of Software**
Inside The World Of Betas
- 76 **Up To Speed**
Upgrades That'll Keep
You Humming Along
- 78 **The Archivists**
Apps To Rein In Your
Media Library
- 82 TuneUp Utilities 2011
PDF to JPG Converter
- 83 Adobe Acrobat X Pro
Sony Vegas Pro 10
- 84 Google App Inventor Beta
Digiarty Software WinX HD Video
Converter Deluxe 3.10.1
- 88 **Will The Real Netbook
Please Stand Up?**
Chrome OS, The Chrome
Web App Store & The Chrome
OS Notebook

Digital Living

- 92 **Where Jesters Are Kings**
The Rise Of The Web Video Stars
- 97 **At Your Leisure**
PC & Console Games & Gear

Tips & Tricks

- 100 **Software Tips & Projects**
Group Policy Editor Shenanigans,
Continued

What's Cooking

- 102 **Technically Speaking**
An Interview With Public
Knowledge's Sherwin Siy
- 105 **Under Development**
A Peek At What's Brewing
In The Laboratory

Back Door

- 110 **Q&A With Rob Powers**
NewTek's VP Of 3D Development
Makes A Scene

Editor's Note

As we put the finishing touches on this issue, we are still basking in the glow of our various and collective yuletide festivities, which can only mean one thing: the International Consumer Electronics Show is imminent.

When I first came to Sandhills Publishing, we didn't attend CES because all the computer-type action was still at a now-defunct show called Comdex, which used to fall just prior to Thanksgiving. But for the last several years now, the computer industry has adopted CES as the big annual trade show for the United States.

We'll be in Las Vegas for the show for the better part of a week, getting all the info we can on the new products that will be streaming out into stores in the coming months, catching up with industry contacts, and generally running ourselves ragged. CES is a grueling but highly useful part of what we do throughout the year in the course of producing *CPU*, and I'm looking forward to seeing what kinds of devices, components, and various other items we'll be covering over the next several months.

The bottom line is that in the case of Team *CPU*, what happens in Vegas *does not* stay in Vegas. And for the most part, that's a good thing.

Before I get too far ahead of myself, though, I should point out that we have a lot of good stuff for you this month. If you've seen the cover, you know we'll be spending some time on cooling, and you probably know why: Heat is the enemy of all those parts you so eagerly unpacked and lovingly installed.

We all pretty much get the Why at this point, especially those of us with a yen to overclock our stuff, but the How isn't always quite as clear. How much cooling do you need? What kind of cooling system should you choose? How can you be sure the gear you installed is getting the job done, and what can you do with fans and other airflow modifications to improve interior temps?

We'll help you answer these questions and maybe one or two others this month, so kick back with the issue and the last two or three Christmas cookies, and enjoy.



Chris Trumble, Publication Editor, *CPU*



Customer Service

(For questions about your subscription or to place an order or change an address.)

customer-service@cpumag.com

Toll Free: (800) 733-3809

Fax: (402) 479-2193

To make a payment

Computer Power User

P.O. Box 85673

Lincoln, NE 68501-9507

General inquiries

Computer Power User

P.O. Box 82545

Lincoln, NE 68501-9507

Hours

Mon. - Fri.: 8 a.m. to 6 p.m. (CST)

Online Customer Service &

Subscription Center

www.cpumag.com

Web Services

(For questions about our Web site.)

webhelp@cpumag.com

(800) 733-3809

Authorization For Reprints

Toll Free: (800) 247-4880

Fax: (402) 479-2104

Editorial Staff

editor@cpumag.com

Fax: (402) 479-2104

131 W. Grand Drive

Lincoln, NE 68521

Subscription Renewals

(800) 382-4552

Fax: (402) 479-2193

www.cpumag.com

Advertising Staff

Toll Free: (800) 247-4880

Fax: (402) 479-2104

131 W. Grand Drive

Lincoln, NE 68521



Gotcha.
Here it is.



**AT 100MB/S READ
AND 70MB/S WRITE...**

**OTHERS
DON'T
EVEN
COME
CLOSE.**

GO SUPERSONIC

USB 3.0

QUAD CHANNEL

PATRIOT
MEMORY



Buy.com

NCIX.com



amazon.com

Canada Computers
www.canadacomputers.com

TigerDirect.com

COMPUSA.com

MICRO CENTER
computers & electronics

WWW.PATRIOTMEMORY.COM

Copyright © 1985 – 2011, Patriot Memory® LLC. All Rights Reserved.



www.facebook.com/patriotMEM



twitter.com/patriotmemory

COMPILED BY BLAINE FLAMIG



Not For "The Faint Of Heart"

Meet the 3.8-pound, 12.1-inch Cr-48, the Chrome OS-based laptop that Google demoed in December. Juicier tidbits concerning the Cr-48 included its "always online" approach via Wi-Fi and Verizon 3G integration complete with a monthly 100MB free Verizon 3G data plan. Elsewhere, Google claims users can expect eight hours of battery life and eight days standby, 10-second boots, and no spinning hard drive, meaning nearly complete reliance on cloud-based services, including apps from Google's new Chrome Web Store. Related is the promise of regular, seamless OS updates, meaning upon each power-up, the Cr-48 "upgrades itself with the latest features and fixes." Initial models from Acer and Samsung are slated for mid-year 2011 for a still-undisclosed price. ■

Shogun Bros. Launch Mouse With Split Personality

We've seen a lot of mouse makers over the years take interesting twists and turns with their gaming mice, but Shogun Bros.' Chameleon X-1 (\$55; precision tracking; five-stage adjustable dpi reaching 1,600dpi) may just take the cake where originality is concerned. Set for availability in Q1 2011, the wireless X-1 looks normal enough from a top view, building seven buttons and a scroll wheel into its tasty cherry-red exterior. Flip the rodent over, however, and you'll discover a 14-button gamepad on the bottom ready for Windows-compatible PC gaming. Further, the Chameleon can also function as a multimedia/presenter remote. The question remaining is how well the Chameleon will perform. ■



WATCHING THE CHIPS FALL

Here is the pricing information for various AMD and Intel CPUs.

CPU	Released	Original Price	Company Pricing*	Newegg.com Retail Price*
AMD Phenom II X6 1100T (Black Edition)	12/7/2010	\$265**	\$265**	\$269.99
AMD Phenom II X6 1090T (Black Edition)	4/27/2010	\$295**	\$295**	\$229
AMD Phenom II X6 1055T	4/27/2010	\$199**	\$199**	\$179
AMD Phenom II X4 970 (Black Edition)	9/21/2010	\$180**	\$185**	\$185.99
AMD Phenom II X4 965 (Black Edition)	8/13/2009	\$245**	\$165**	\$159.99
AMD Phenom II X2 555 (Black Edition)	1/25/2010	\$105**	\$90**	\$89.99
AMD Phenom II X2 560 (Black Edition)	9/21/2010	\$105**	\$102**	\$99.99
AMD Athlon II X4 Quad-Core 640	5/10/2010	\$122**	\$99.99**	\$99.99
AMD Athlon II X4 Quad-Core 645	9/21/2010	\$122**	\$112**	\$115.99
AMD Athlon II X3 Triple-Core 445	5/10/2010	\$87**	\$76**	\$77
Intel Core i7-980X Extreme Edition	3/11/2010	\$999**	\$999**	\$999.99
Intel Core i7-970	7/18/2010	\$885**	\$885**	\$879.99
Intel Core i7-950	6/2/2009	\$562**	\$294**	\$294.99
Intel Core i7-875K	5/28/2010	\$342**	\$342**	\$319.99
Intel Core i5-760	7/18/2010	\$205**	\$205**	\$204.99
Intel Core i5-750	9/8/2009	\$196**	\$196**	\$199.99
Intel Core i5-655K	5/28/2010	\$216**	\$216**	\$199.99
Intel Core i3-560	8/29/2010	\$138**	\$138**	\$149.99
Intel Core i3-550	Q2 2010	\$138**	\$117**	\$124.99
Intel Core i3-540	Q1 2010	\$133**	\$117**	\$114.99

* As of December 2010

** Manufacturer's estimated price per 1,000

Happy Trails VGA

2015. That's the year that Intel and AMD plan to kill off support in their product lines for increasingly passé outputs, the companies recently announced along with Dell, Lenovo, Samsung, and LG Display. Specifically, Intel will end support for the LVDS (low voltage differential signaling) interface in 2013 and axe VGA support by 2015 in its PC client processors and chipsets. AMD plans to do the same with LVDS for most products by 2013. It will remove native VGA outputs starting in 2013 and do the same for all products by 2015. Expectedly, the companies cite HDMI and DisplayPort's advantages as the reason, including those technologies' prowess for supporting "slimmer laptop designs" and "higher resolutions with deeper color" vs. the 20-plus year VGA. ■

Hardware Mole

The Tablet Craze Is Officially On

These days, it seems computing is all about the tablet. Thanks to the iPad and overall increasing tablet popularity, Gartner trimmed its 2010 PC shipment growth projection for 2010 from 17.9% over 2009 to 14.3% (352.4 million shipments). By 2014, Gartner's Ranjit Atwal stated that "media tablets are expected to displace around 10% of PC units." IDC, meanwhile, is calling for tablet and other app-enabled device shipments to pass PC shipments during the next 18 months, with mobile device shipments reaching 462 million in 2012 vs. 448 million for PCs. Elsewhere, DisplaySearch reported that if one considers the iPad a "mobile PC," Apple now ranks as the United States' No. 1 mobile PC vendor shipments-wise and world's third (12.4%) behind HP (17.3%) and Acer (16.5%). ■

Could Trendnet Be In Your Post-Holiday Plans?

If the holidays were good to you in a high-definition home theater, gaming console, AV receiver, or other hardware Ethernet-ready sort of way, you might want to give Trendnet's TEW-640MB (\$69.99) a look. The 300Mbps Wireless N Media Bridge sports no less than four ports with WMM QoS technology built in to prioritize video and audio content tasks. Trendnet claims no drivers are needed to get started, and when the bridge's Wi-Fi Protected Setup button is in tandem with a router also sporting the button, connections are a relative breeze. Elsewhere, Trendnet states "the latest in wireless encryption ensures wireless security," while Advanced MIMO helps fill those dead spots. ■



Nox Scout Will Take Your Call In Very Small Manner

The tech trade is ripe with "world's first," "world's biggest," "world's fastest," and other similar claims. Well, add "world's smallest built-in send/end button" to the list. That's what Nox Audio is claiming with its new Nox Scout earbuds (\$79.99; white or black models available), which features an itty, bitsy call-control button in where the earbuds' right and left cables join. Friendly with gear sporting a 3.5mm jack, the buds are also Xbox 360- and PS3-compatible if you have Nox Audio's Negotiator Universal Optical Gaming Adapter (\$59.99) in your arsenal. With the Scout you're getting 6mm balanced armature drivers said to provide "exemplary bass and a wide, clean, dynamic sound range"; 3mm omnidirectional microphone with hi-fi voice pickup; and a stately design as exemplified by the buds' squarish flat cables. ■



1&1® WEB HOSTING

"Working with startup companies on a tight budget, my clients know an online presence is needed. I use 1&1 exclusively to satisfy their requests for reliable hosting at affordable rates."

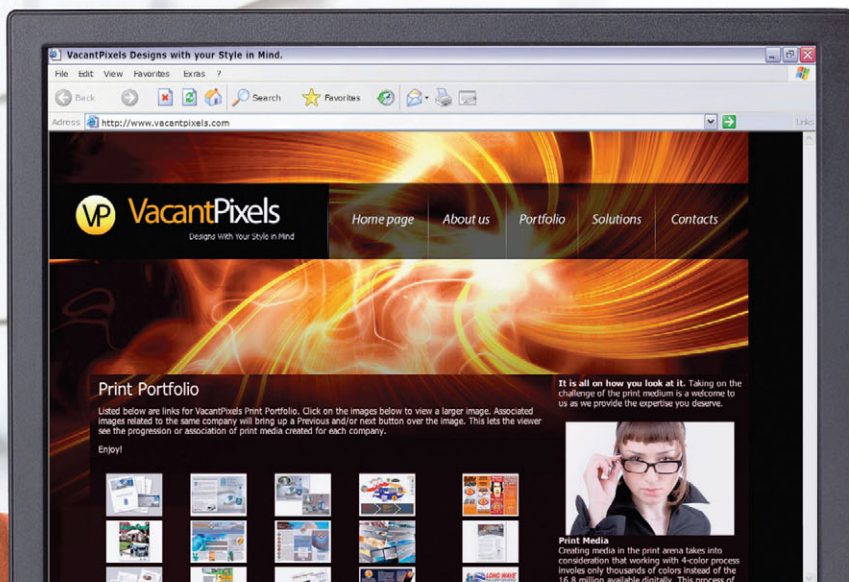
Lance Ochs, www.vacantpixels.com



PROFESSIONAL WEBSITES 6 MONTHS FREE!*



*Offers valid for a limited time only. 12 month minimum contract term applies for web hosting offers. Setup fee and other terms and conditions may apply. Mobile software selection dependent on hosting package and requires a Windows PC. Domain offers valid first year only. After first year, standard pricing applies. Visit www.1and1.com for full promotional offer details. Program and pricing specifications and availability subject to change without notice. 1&1 and the 1&1 logo are trademarks of 1&1 internet AG, all other trademarks are the property of their respective owners. © 2011 1&1 Internet, Inc. All rights reserved.



As the world's largest web host, we know the developer features you need in a hosting package!

**.com
.info .org
.net**

Domains Included

All hosting packages include domains, free for the life of your package.



Unlimited Traffic

Unlimited traffic to all websites in your 1&1 hosting package.



Developer Features

Extensive language support with PHP 5/6 (beta) with Zend Framework and git version management software.



Online Marketing Tools

SEO tools to optimize your website. 1&1 Webstatistics makes it easy to monitor your progress.



Green Data Centers

We're committed to hosting your site with a minimal impact on the environment.

1&1® HOSTING PACKAGES

6 MONTHS FREE!*

1&1® BUSINESS PACKAGE:

- 3 Included Domains
- Private Domain Registration
- 250 GB Web Space
- UNLIMITED Traffic
- **NEW:** Version Management Software (git)
- 2,500 E-mail Accounts
- 50 MySQL Database (100 MB)
- 25 FTP Accounts
- E-mail Marketing Tool
- 24/7 Toll-free Customer Support

~~\$9.99~~
per month*

Need more domains?

.info domain only \$0.99 first year*

.com domain only \$4.99 first year*

More great offers available
on our website!



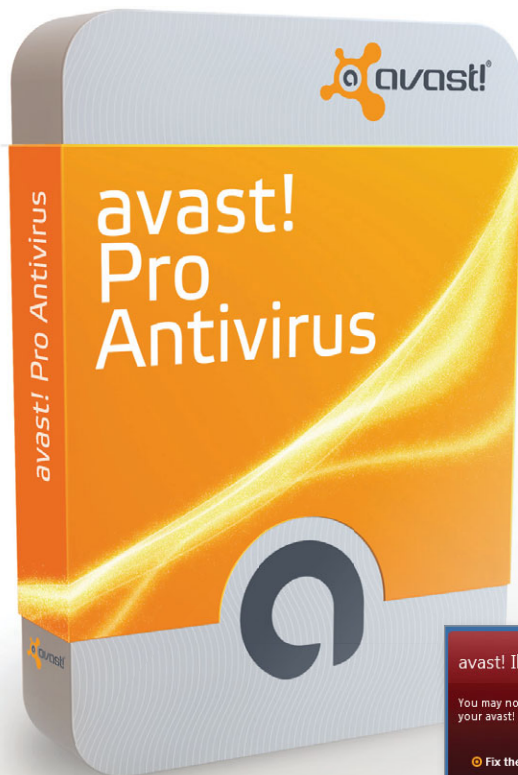
Get started today, call 1-877-GO-1AND1

www.1and1.com

Avast Software Goes Viral—In A Bad Way

Avast Software claims it's always prided itself on how word gets around concerning its antivirus software, with "80% of new users coming through the recommendations of satisfied friends." Still, the rate at which a multiuser license for its avast! Pro Antivirus recently spread took the company aback. In short, a 14-user license Avast issued June 30, 2009, for a Tucson, Ariz., company "mushroomed to 774,651 active users by late

2010" located in 200-plus countries, including Vatican City. Discount the 14 original users and the others are, you guessed it, pirates. Avast CEO Vince Steckler stated Avast wanted to see how widespread one license could get. With the help of warez sites, the answer was "very." Russia led all countries with the most pirated licenses, which Avast states it's in the process of converting to legal products. For the record, Pro's antivirus engine is the same as avast! Free Antivirus but adds a virtualization sandbox and Script Shield. ■



Is The Proposed Intel-McAfee Merger Unfair?

Initially, Intel had reportedly hoped to complete a proposed \$7.7 billion merger with McAfee by late 2010 or Q1 2011. Opposition that a European Union antitrust regulator reportedly voiced privately, however, could push the completion out further, various sources reported, including *The Wall Street Journal*. The concerns seemingly relate to Intel's plans to embed security features directly into its processors and if such would give the Intel-owned McAfee "privileged access" to the features and an advantage over other vendors. If EU regulators decide a longer examination of the merger is necessary, it could delay the acquisition, which Intel and McAfee announced in August 2010. The EU reportedly faces a Jan. 12 deadline to submit its judgment or announce it will conduct an extended review. Intel, McAfee, and the European Commission had yet to comment on the alleged concerns. ■

Sony Unveils PlayStation Apps; Leaves U.S. Users Out

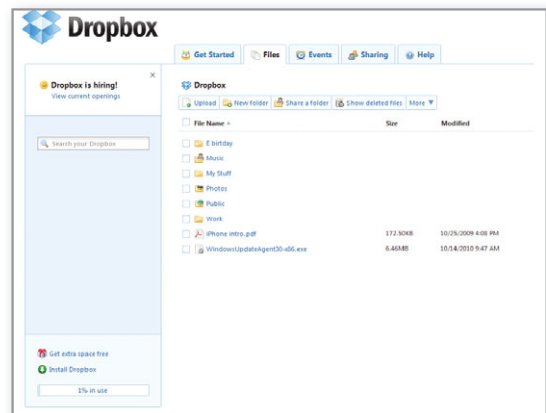
On the European version of its PlayStation Blog, Sony announced in late December that a free Official PlayStation App is coming "very soon" for owners of iPhone and iPod touch (with iOS4 or higher) devices and compatible Android handsets (1.6 or higher). Beyond eyeballing your PlayStation Network trophies, the app will support viewing friends' games and online statuses; getting PlayStation-related games and hardware news; and sharing features via Facebook, Twitter, and email. Users in the UK, France, Germany, Spain, Italy, and The Netherlands will get access to the app first, and Sony states it's working on versions supporting most Sony Computer Entertainment Europe countries and languages. ■



Software Shorts

Dropbox Reaches The Big 1.0

As Dropbox's Jon Ying blogged in mid-December concerning the super cloud syncer's official 1.0 release, "The service has grown from a simple sync app to something that's changed the way lots of people work and communicate." Amen. With version 1.0, you can look forward to up to 50% reductions in memory usage thanks to a retooled client-side sync engine, as well as selective sync ability that lets you choose which folders you want to download to specific computers vs. downloading your entire Dropbox folder to all your computers. Additionally, Dropbox added extended attribute sync abilities that make certain resource forks and other extended attributes don't go ignored and redesigned the setup wizard for Windows, Mac, and Linux platforms complete with more "organized, intuitive, and snazzy" preference menus. ■



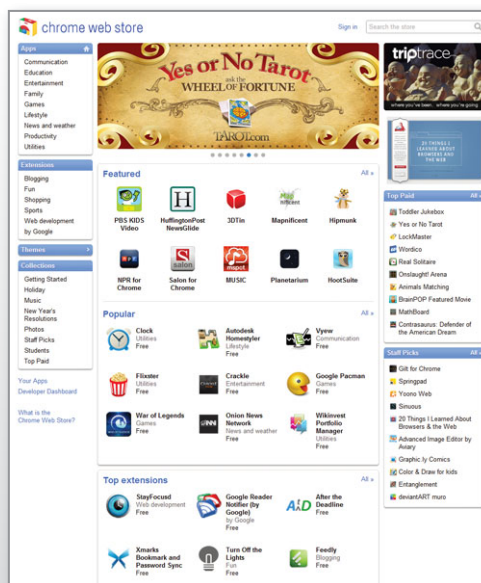
How Timely Are Developers?

In a survey that may only interest software developers, Evans Data found that 51% of North American developers delivered their latest projects on time, while two-thirds turned them in three weeks past the target date. Evans polled more than 1,200 developers in North America, APAC (Asia and Pacific), and EMEA (Europe, Middle East, and Africa) for the Global Development Survey, which it conducts twice yearly. Overall, APAC developers are less likely to hit their deadlines, and only 36% of European developers handed their projects in on time with less than 60% delivering the goods within three weeks. Elsewhere, Evans found that 27% of North American developers now use HTML5, while another 48.9% plan to; 46% use security tools during design and development; and Windows 7 now tops Windows XP as the top development desktop OS in North America. ■

"Careless Computing"

Eric Schmidt may consider the recent updates Google announced for Chrome and Chrome OS as "among the most important of my working life" but not everyone is thumbs up on Chrome OS, which Schmidt dubbed as "a viable third choice in desktop

operating systems." Richard Stallman of Free Software Foundation and GNU fame, for example, recently told The Guardian that Chrome OS appears to be a plan to "push people into careless computing" in the sense that it forces users to store data in the cloud vs. locally where they can directly control it. Stallman, who has knocked cloud services for years, opined that "I suppose many people will continue moving towards careless computing because there's a sucker born every minute." Paul Buchheit, credited with creating Gmail, meanwhile, posted on FriendFeed (which he also founded): "Prediction:



Chrome OS will be killed next year (or 'merged' with Android). He later added that "ChromeOS has no purpose that isn't better served by Android (perhaps with a few mods to support a non-touch display)." ■

U.S. Lags Behind World In Internet Connection Speed

In many circles, speed is king in terms of the faster something moves, the better it is. Using that as a barometer, the United States isn't faring so well where average Internet connection speeds are concerned, ranking just 25th globally, according to a recent report from the Communications Workers of America and Speedmatters.org. South Korea's 34.1Mbps median download speed leads the charge, besting Sweden (22.2Mbps), Romania (20.3Mbps), and Japan (18Mbps). The United States' median 3Mbps download speed increased just 0.5Mbps from 2009 and actually sits below the 4Mbps mark the FCC dubs as broadband-worthy. At the current growth rate, the report states, the United States will need 60 years to catch up with South Korea. ■

The Internet Does Age-Discriminate

Move over geeks. The Internet isn't just primarily for youths any longer. Or so results from a Pew Internet & American Life Project "Generations 2010" report would suggest. Take, for example, findings that Gen X (34- to 45-year-old) Internet users and "older cohorts are more likely than Millennials [18 to 33] to engage in several online activities, including visiting government Web sites and getting financial information online." Also interesting is "the fastest growth has come from Internet users 74 and older," for which social network usage has jumped from 4% to 16% since 2008. Among users 18 years old and older, meanwhile, searching for health-related information is the third most popular online activity, something that was once the "primary domain of older adults." One online activity that's apparently fading, however, is blogging, which Pew cites as having "peaked" due to more social networking-related activity and micro-blogs usage. ■

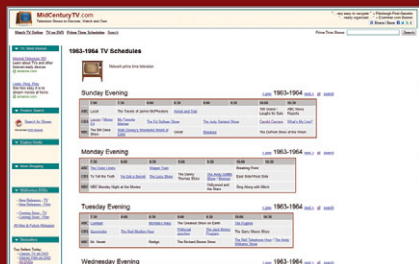
Online Shopping Does Record Business

Remember when many people were afraid to shop online? No longer. ComScore reported in late December that for the first 47 days of the November-December holiday shopping season, \$27.46 billion in business was conducted online, a 12% spike vs. the same period a year previous. From Dec. 11 to 17 alone, spending reached roughly \$5.51 billion, a 14% increase from the year before. Spending for the week got a huge boost from the so-called Green Monday (Dec. 13), on which \$954 million was spent, and Free Shipping Day (Dec. 17), which 1,500-plus merchants took part in and generated another \$942 million in business. Compared to Dec. 17, 2009, spending jumped a remarkable 61%, ComScore reported. ■

Site Seeing

MidCenturyTV.com: A Middle-Aged TV Lover's Dream

We all know about the bounty of magnificent free gems available at the Internet Archive, including the Classic TV subsection. As MidCenturyTV.com points out, however, the videos available aren't organized by television series, something MidCenturyTV.com has done by not only organizing shows into wonderful Prime Time Schedules by year, but also in Watch Online Any Time (via Hulu, Fancast, and so on) and TV On DVD categories. MidCenturyTV.com's offerings specifically span "that time from the Truman through Nixon administrations" (or 1948 to 1974 precisely), with links available for the likes of the "George Burns and Gracie Allen Show," "This Is Your Life," "Life Of Riley," "Sergeant Preston Of The Yukon," "Peter Gunn," "The Twilight Zone," "Hawaii Five-O," "Kojak," and many more. The magical box never looked so good. ■



Fitango.com Puts Action Into Plans

Ever been determined to put a plan into action, only you lacked a specific plan? Fitango.com is here to help. Still in beta, the site "helps you get things done and achieve your goals" by offering free and paid "Actionplans" that experts create. Plans cover fitness, health, parenting, career, pets, musical instruments, and other categories. Further, if you consider yourself an expert in a field, you can develop and sell your own Actionplan (upward of 70% commission on each sale). Other features include inviting others to personally motivate you, accessing plans from anywhere via an iPhone app, Facebook and calendar integration, charting success via graphs and other analytical tools, and more. Additionally, if you're not certain an Actionplan is paying dividends, you can chat with other users using the same one to compare notes. ■

FEATURED ON THE COVER



KINGSTON HYPERX MAX 3.0 EXTERNAL USB DRIVE PINT-SIZED POWERHOUSE

If you could design your ideal portable external storage device, what would you include? You'd want exceptionally small size most likely, and, of course, optimal speed and durability. Well, good news—Kingston already made the device you're thinking of, and it's called the HyperX Max 3.0 external USB hard drive.

The HyperX Max 3.0 is incredibly portable, measuring just 2.89 x 4.67 x 0.47 inches, and because it gets all the power it needs through its USB 3.0 connection, there's no bulky power adapter to tote around. It also needs no special drivers, so you can enjoy plug-and-play usability.

We all know portable external hard drives can take a beating when bouncing around that courier

bag or large purse; that's why the HyperX Max 3.0 is built with a sturdy aluminum casing and sports an operating shock capability of 1500G. And because the HyperX Max 3.0 employs SSD storage and has no moving parts, the drive will stand up to the rigors of travel.

In addition to the zip that the flash storage brings to the HyperX Max 3.0, the drive boasts a USB-IF SuperSpeed-certified USB 3.0 interface (which is also backward-compatible with USB 2.0), for a theoretical 10x boost over the last USB generation. Kingston promises high-speed data transfer speeds of up to 195MBps read and 160MBps write, delivering unprecedented performance for saving and moving all those HD video

clips, RAW image files, and other massive files you've been stockpiling.

The HyperX Max 3.0 consumes just 4.5W of power, and it has dual LEDs that are handy for indicating at a glance whether the device is operating via USB 3.0 (blue) or USB 2.0 (green).

Backed by a three-year warranty and 24/7 live tech support, the HyperX Max 3.0 is available in 64GB (SHX 100U3/64G), 128GB (SHX 100U3/128G), and 256GB (SHX 100U3/256G) models. It supports Windows XP (SP3), Vista (SP1 and SP2), and Windows 7 and includes a USB 3.0 micro-B plug to USB 3.0 standard-A cable. ■

 amazon.com

 Buy.com



 TigerDirect.com

Windows®. Life without Walls™, CyberPower recommends Windows 7



FREE
Liquid Cooling
on all systems



Gamer Infinity 8800 Pro SE

Intel® Core™ i7 Processor

Genuine Microsoft™ Windows® 7 Home
Premium 64-bit Edition

Asus® Sabertooth X58 USB3.0 & SATA 3 Mainboard

Corsair® 12GB DDR3 1333 Triple Channel Memory

Kingston® 30GB SSD(Boot) +1TB SATA III DATA HDD

Nvidia® GeForce® GTX 470 1.2GB Direct X 11 Video

AZZA Hurricane 2000 Full Tower Case 800 Watt Power

Asetek Liquid Cooling System

Nvidia® 3D Vision Glass and LCD + \$499



Intel® Core™ i7 Processor

i7

(8MB L3 Cache, 1066Mhz)

Extreme i7-980X 3.33Ghz

i7-970 3.20Ghz

i7-960 3.20Ghz

i7-950 3.06Ghz

\$ 2259

\$ 2095

\$ 1779

\$ 1485

From

\$1485

CyberPOWER Inc. YOUR UNLIMITED GAMING SOLUTIONS

Unleash THE POWER

Gamer Xtreme XT

Intel® Core™ i7 Processor

Genuine Microsoft™ Windows® 7 Home
Premium 64-bit Edition

Asus® Sabertooth X58 USB3.0 & SATA 3 Mainboard

Corsair® 6GB DDR3 1333 Triple Channel Memory

1TB SATA-III 6.0 7200 RPM HD 32MB Cache

NVIDIA® GeForce® GTX 460 1GB Direct X 11 Video Card

Raidmax Black Storm gaming case with 600 Watt Power

Asetek Liquid Cooling System



Intel® Core™ i7 Processor

i7

(8MB L3 Cache, 1066Mhz)

Extreme i7-980X 3.33Ghz

i7-970 3.20Ghz

i7-960 3.20Ghz

i7-950 3.06Ghz

\$ 1885

\$ 1719

\$ 1405

\$ 1109



From **\$1109**



Gamer Xtreme 1000

Intel® Core™ i7 Processor

Genuine Microsoft™ Windows® 7 Home Premium 64-bit Edition



Intel® H55 Chipset MB



Corsair® 4GB DDR3 1333 Dual Channel Memory



1TB SATA-II 3.0 7200 RPM HD 16MB Cache



NVIDIA® GeForce® GT 430 1GB Direct X 11 Video Card



Raidmax Typhoon Gaming Case 450 Watt

Asetek Liquid Cooling System



Gamer Xtreme 2000

Intel® Core™ i7 Processor

Genuine Microsoft™ Windows® 7 Home Premium 64-bit Edition



Intel® H55 Chipset MB



Corsair® 8GB DDR3 1333 Dual Channel Memory



1TB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD

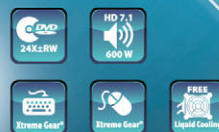


ATI Radeon™ HD 5670 1GB Direct X 11 Video



CoolerMaster HAF 912 Gaming Tower Case w/ 600 W Power Supply

Asetek Liquid Cooling System



Gamer Infinity 8000

Intel® Core™ i7 Processor

Genuine Microsoft™ Windows® 7 Home Premium 64-bit Edition



ASUS® Sabertooth X58 USB 3.0 & SATA 3 Mainboard



Corsair® 6GB DDR3 1333 Triple Channel Memory



1TB S ATA-III 6.0 7200 RPM HD 32MB Cache



NVIDIA® GeForce® GTS 450 1GB Direct X 11 Video Card



Aepvia X-Dreamer 3 Gaming Case / 600 Watt CrossFire Power

Asetek Liquid Cooling System

Intel® Core™ i7 Processor

i7 (8MB L3 Cache, 1066MHz)
i7-860 3.06GHz \$ 1099
i7-870 2.93GHz \$ 849
i7-870 2.93GHz \$ 795

i5 i5-760 2.80GHz \$ 705
i5-650K 3.20GHz \$ 719
i5-650 3.20GHz \$ 679

i3 i3-550 3.20GHz \$ 599

From
\$599

Intel® Core™ i7 Processor

i7 (8MB L3 Cache, 1066MHz)
i7-880 3.06GHz \$ 1225
i7-875K 2.93GHz \$ 975
i7-870 2.93GHz \$ 915

i5 i5-760 2.80GHz \$ 829
i5-680 3.33GHz \$ 915
i5-655K 3.20GHz \$ 839
i5-650 3.20GHz \$ 799

i3 i3-550 2.93GHz \$ 725

From
\$725

Intel® Core™ i7 Processor

i7 (8MB L3 Cache, 1066MHz)
Extreme i7-980X 3.33GHz \$ 1885
i7-970 3.20GHz \$ 1715
i7-960 3.20GHz \$ 1395
i7-950 3.06GHz \$ 1095

From
\$1095

Order Toll Free All Desktop systems come with 3 year Limited Warranty + lifetime toll free techsupport

800-707-0393 www.cyberpowerpc.com

Gamer Xplorer X7-7300

Intel® Core™ i5 540M Processor



Intel® PM55 Chipset
Intel® WiFi Link 5300 802.11 A/G/N

Genuine Microsoft™ Windows® 7 Home Premium 64-bit Edition

4GB DDR3 PC1333 Memory

500GB SATA150 Hard Drive

17.3" Full HD 1920 X 1080

Nvidia® GeForce® GT 425M 1GB video

1000/100/10 Network Card

Free Carrying Case



1x HDMI

1x eSATA

3x USB 2.0

3 hr

7.6 Lbs

DVD 24X±RW

9 in 1 Media Card

Intel® Core™ i5 Processor

i5 560M \$1089
540M \$999

From
\$999

Gamer Xplorer X6-8500

Intel® Core™ i5 540M Processor



Intel® HM55 Chipset
Intel® WiFi Link 5300 802.11 A/G/N

Genuine Microsoft™ Windows® 7 Home Premium 64-bit Edition

4GB DDR3 PC1333 Memory

500GB SATA150 Hard Drive

15.6" Full HD 1920 X 1080

ATI Mobile Radeon™ HD5650 1GB

1000/100/10 Network Card

Free Carrying Case



1x HDMI

1x IEEE 1394

3x USB 2.0

3 hr

5.9 Lbs

DVD 24X±RW

9 in 1 Media Card

Intel® Core™ i5 Processor

i7 8400M \$1345
7400M \$1089

i5 560M \$1035
540M \$989

From
\$989



CyberPOWER Inc.



Job Of The Month

Calling all CSI addicts. If you want to enjoy the thrill of forensics but stick to your own IT skills, government contractor Northrop Grumman is looking for a "Cyber Forensics Specialist" who analyzes data intrusions with the precision a CSI team devotes to a crime scene. Your job is to trace malware events and other digital invasions. You will reverse-engineer malware files and recommend counter-measures. And the stakes are high. Northrop Grumman is looking for people with a Q security clearance from the Department of Energy or a Top Secret security clearance from the DoD. Q clearance allows access to nuclear-related materials—even the cooler-than-cool CSI Miami crew doesn't have that.

(bit.ly/emQAFq)

Twitter Use Varies By Group

According to a new Pew Internet & American Life Project survey, only 8% of Internet users in the United States use Twitter, but the user base for the micro-blogging sensation varies greatly by demographic group.

Group	Percent Of Internet Users Who Use Twitter
All Internet Users	8%
Men	7%
Women	10%
Age 18-29	14%
Age 30-49	7%
Age 50-64	6%
65+	4%
White, non-Hispanic	5%
Black, non-Hispanic	13%
Hispanic	18%
HH Income Less than \$30,000	10%
\$30,000 - \$49,999	6%
\$50,000 - \$74,999	10%
\$75,000	6%
Urban	11%
Suburban	8%
Rural	5%

twitter

Is Insomnia A Professional Work Hazard In IT?

Software programmers may love telling war stories about sleeping under their desks during "crunch time" and coding for days on energy drinks and pizza, but sleeplessness in IT is no laughing matter. According to a study of one company's software engineers by researchers at the University of Mysore, India, 56% suffered mild or severe insomnia, compared to 23% of the general population. Younger workers tended to suffer sleep problems more than older workers. And while women experienced



milder insomnia, men tended to have more severe cases. The researchers suggested that lack of shuteye affects IT workers' quality of life and that sleep assessments should be part of their routine medical check-ups.

(Source: Springer Science + Business Media)

RAW Numbers



4%

Percent of U.S. Internet users who access location-based services

(Pew Research Center)

22 MILLION

Number of U.S. mobile customers who access video on handsets

(Nielsen)

97.9 MILLION

Number of Americans watching time-shifted (DVR) TV

(Nielsen)

130

Number of people who have friended the average Facebook user

(Facebook)

Facebook Takes Over The World

The latest update to Facebook's Statistics page demonstrates the staggering worldwide reach of the service and its hold on members. Facebook says that 50% of its more than 500 million active users log onto the site on any given day for a total of 700 billion minutes per month. The move of social networking to the mobile platform is clearest at Facebook, where 200 million of its users now access the service from mobile devices each month. And with the introduction of Facebook Connect, which lets members use their Facebook login on other sites, over 250 million people now engage with the network on more than 2 million other sites. Now they are playing with power.



Light, swift, and silent. Or massive, loud, and stationary. Either way, what bliss.

BY MARTY SEMS

Sakakibara-Kikai Kid's Walker

Should Dr. Evil ever return to the big screen in a sinister exoskeleton, the camera will pan down to Mini-Me driving this. Although we had initially hoped for some rompin' stompin' fun from this miniature mecha, clips on the Web site (www.sakakibara-kikai.co.jp) reveal that the \$22,000 Kid's Walker is grossly misnamed. It doesn't actually walk: It skates along as its legs make token cross-country skiing motions. In other words, it will be up to your gruff but lovable mechanic to mod this thing up to a more appropriate level of menace. After all, when your own Megazord is on the ropes, you'll need your diminutive sidekick to be able to man up and save the day. ■



Wisdom Audio STS

Loud as Miramar, but deep and clear as Lake Tahoe. Even near the low threshold of human hearing, 20Hz, the STS subwoofer's (\$10,000; www.wisdomaudio.com) 15-inch drivers can pump out 130dB. That's above rock concerts in most scales of loudness, gigs by Hotblack Desiato and Disaster Area excepted. In fact, it's more along the lines of loitering by a runway as a passenger jet takes off. And yet this 5-foot-tall, 350-pound monsta sub wouldn't be all that if it sounded like mud, so Wisdom Audio crafted it for minuscule distortion and 101dB sensitivity. Not exactly the level of gentility one would expect, is it? ■



Tag 60 Tang

Enviro-yachts catch our eye. Throw in air conditioning and a flatscreen TV, and you have our full attention. *Tang* (www.tagyachts.com) is a unique plug-in hybrid detailed more thoroughly by motor supplier Electric Marine Propulsion (www.electricmarinepropulsion.org) and lithium-ion vendor International Battery (www.internationalbattery.com). Come sail away on this 60-foot, carbon fiber catamaran under wind or battery power, keeping the diesel generators in reserve for those tedious horse latitudes. *Tang* should be making a silent running from South Africa to its Floridian owner by the time you read this. ■



An IGP For All Seasons

AMD 890GX & 880G Motherboards Enter The Octagon

A flagship is big. Designed to be the armada's biggest and best, the flagship is what you turn to when you need to muster every last ounce of firepower to smash your opposition. AMD's current flagship chipset, the 890FX, brings 42 lanes of PCI-E 2.0 connectivity to bear, 32 of which are reserved for the graphics subsystem alone. It's a beast, and rightly deserving of its spot at the top of the 8 Series pecking order.

But what happens when you need a nimbler vessel, capable of navigating smaller bodies of water? When you're building a small HTPC or SFF system, you need a more agile option. This is where the rest of AMD's 8 Series family comes into play. The 890GX and 880G are both examples of how you can pack almost every feature of the 890FX into a smaller footprint. The key difference includes one PCI-E x16 graphics slot (or, in the case of the 890GX, two PCI-E x16 slots [optionally] operating at x8) rather than two full-powered PEG slots.

However, if you don't plan on purposing your rig to be a gaming monster, the 890GX and 880G will both rumble on without the aid of discrete graphics. The 890GX relies on an integrated Radeon HD 4290 GPU, while the 880G includes an HD 4250 IGP. Both chipsets support Hybrid graphics, and other features such as AM3 processor support and, in most cases, SATA 6Gbps are present and accounted for, too.

This gaggle of AMD boards represents a few different options upon which you can build, from the diminutive Mini-ITX Asus M4A88T-I Deluxe to the beastly ASRock 890GX Extreme4.

Given the different form factors represented here (save for the Mini-ITX Asus board that lagged behind largely due to the scaled-down components it supports), the similarities are all the more striking.

ASRock 890GX Extreme4

The ASRock 890GX Extreme4 is a big, bad motherboard designed for enthusiasts. The board supports sockets AM3/AM2+ for compatibility with both older and newer CPUs, including AMD's line of hexa-core chips, as well as USB 3.0 and SATA3 6Gbps.

In a CrossFireX configuration, two cards will run at x8 each; and a third graphics card will run at x4. As we mentioned earlier, the integrated graphics is a Radeon HD 4290 (DirectX 10.1-compliant), if you're interested in using a decent Hybrid CrossFireX configuration.

The 890GX Extreme4 also supports 128MB of DDR3-1333 sideport memory for an extra performance boost. A front USB 3.0 adapter gives you two additional front-mounted USB 3.0 ports, which was a nice bit of extra hardware to find in the motherboard's box.

This board is also packed with plenty of extra tools and software, including UCC (Unlock CPU Core) and Turbo UCC (which automatically overclocks the system by tweaking the CPU, memory frequencies, and voltage settings) for overclockers; THX TruStudio Pro; Instant Flash, a super-easy BIOS flashing utility; and Instant Boot, which lets you access certain functions within just three or four seconds.



890GX Extreme4
\$134.99
ASRock | www.asrock.com

There are, however, a few extras that are . . . well, extra as in "extraneous." There's ASRock SmartView, which is a start page for Internet Explorer with a social networking bent; ASRock AIWI, which lets you use your iPhone as a game controller; and ASRock App Charger, a tool that is designed to quickly charge your iOS device. However, if any of these peripheral adds actually apply to you, consider them bonuses.

Some of what makes this board a keeper is in the details, such as ASRock's Japanese-made DuraCap high-quality conductive polymer capacitors, which are designed to last far longer than the average capacitor, and the three convenient Smart Switches (power, reset, and clear CMOS) that are physical buttons on the motherboard itself.

Considering the price and its considerable specs, the ASRock 890GX Extreme4 is quite a bargain.

MSI 890GXM-G65

Another 890GX board, the MSI 890GXM-G65 is compatible with all AM3 and AM2+ chips, and it also supports USB 3.0 and SATA 6Gbps.



890GXM-G65
\$129.99
MSI | www.msi.com

Overclockers have a lot of toys to tinker with on the 890GXM-G65, as it sports the Auto OC Genie to automatically optimize your system, as well as UCC (Unlock CPU Core) if you want to attempt to unlock an unused core(s) on an AMD chip. On the board itself, there's a physical Easy OC Switch that lets you ramp up the FSB without messing with BIOS settings.

MSI took the 890GXM-G65's construction seriously. The all-solid capacitors are designed to handle more stress over a longer lifespan, and the passive chipset heatsink is designed to offer better air convection.

There is a smattering of other tools and features that add a little something extra to the 890GXM-G65. Live Update Online and Live Update 4 tag team to automatically check for, download, and install BIOS updates, utilities, and drivers, which helps prevent you from accidentally flashing to the wrong BIOS version and ensures that your system is always up-to-date.

If you really can't wait those agonizing minutes until your iOS device is fully charged, the 890GXM-G65's i-Charger is a special charging utility designed to accomplish the task faster.

Gigabyte 880GMA-UD2H

Despite its diminutive microATX form factor, the Gigabyte 880GMA-UD2H



880GMA-UD2H

\$111

Gigabyte | www.gigabyte.us

holds its own against larger, more expensive boards. It has plenty of features that you'd expect on a contemporary motherboard, such as USB 3.0 and SATA3 6Gbps, as well as support for AM3 and AM2+ processors, but with some extra spice—Gigabyte packed in its 3x USB Power Boost feature to give attached USB devices more juice with voltage output regulation.

However, if you want a good CrossFireX setup, you'll find this board lacking. The 880GMA-UD2H doesn't support CrossFireX; however, it does offer Hybrid CrossFireX, so you can

combine the integrated ATI Radeon HD 4250 graphics with certain discrete graphics cards.

For overclockers, the 880GMA-UD2H offers EasyTune6 for system tweaks and hardware monitoring, and the copper design of the power and ground layers is designed to promote system stability.

The Auto Unlock feature lets you unlock any unused processor cores, and the board's DualBIOS technology provides a safety net flashing the BIOS. Dolby Home Theater, Easy Energy Saver, and On/Off Charge (for quickly charging iOS devices) round out the list of built-in extra features of note.

The graphics expandability is limited, so if you're looking to build a powerhouse system bolstered by a CrossFireX configuration, choose another board. However, the 880GMA-UD2H is an ideal platform for an HTPC or moderate gaming system; you'll still get all the amenities you need, and that gives you the freedom to scale the components up or down to suit your particular needs. All things considered, this board is a terrific value.

Asus M4A88T-I Deluxe

The tiny Asus M4A88T-I Deluxe, also based on the 880G chipset, is a Mini-ITX board that delivers admirable

Strictly Specs	ASRock 890GX Extreme4	Asus M4A88T-I Deluxe	Gigabyte GA-880GMA-UD2H	MSI 890GXM-G65
Chipset	AMD 890GX/SB850	AMD 880G/SB710	AMD 880G/SB850	AMD 890GX/SB850
Form factor	ATX	Mini-ITX	microATX	microATX
PEG slots	3 PCI-E x16	1 PCI-E x16	2 PCI-E x16	2 PCI-E x16
PCI-E x1/x4 slots	1 PCI-E x1	N/A	1 PCI-E x1	1 PCI-E x1
PCI slots	3	N/A	1	1
SATA	6 (5 SATA 6Gbps; 1 eSATA)	4 (3 SATA 3Gbps; 1 eSATA)	6 (5 SATA 6Gbps; 1 eSATA)	6 (5 SATA 6Gbps; 1 eSATA)
USB Ports	2 USB 3.0; 4 USB 2.0 (plus 2 USB 3.0/6 USB 2.0 via headers)	2 USB 3.0; 4 USB 2.0 (plus 2 USB 2.0 via headers)	2 USB 3.0; 4 USB 2.0 (plus 6 USB 2.0 via headers)	2 USB 3.0; 5 USB 2.0; 1 eSATA/USB combo
IDE channels	N/A	N/A	1	1
RAID support	0, 1, 0+1, 5	0, 1, 5	0, 1, 5, 10, JBOD	0, 1, 5, 10
Multi-GPU support	CrossFireX, Hybrid CrossFireX	Hybrid CrossFireX	Hybrid CrossFireX	CrossFireX
Chipset/VRM cooling	Passive/Passive	Passive/Passive	Passive/Passive	Passive/Passive
Price	\$134.99	\$124.99	\$111	\$129.99

performance and features for its scaled-back specifications.

Asus somehow packed in six USB ports, two of which are USB 3.0, as well as HDMI and DVI outputs. It includes 802.11n, with two external antennas, as well as Bluetooth.

The M4A88T-I supports AM3 processors, but only up to 95W TDP, which severely limits the number of AMD chips you can use with it. There are a couple of Phenom II X6 and a handful of X4 CPUs that you can use, but you have to be careful to get one with the lower TDP, as many are rated at 125W TDP. The memory speed is capped at DDR3-1600, which is another, albeit far less significant, bottleneck to keep in mind; what's more noteworthy concerning memory is that the board only supports SO-DIMMs.

There's only one PCI-E slot (x16), but the board supports Hybrid CrossFireX, so you can get decent performance with a discrete card or roll with the integrated Radeon HD 4250 graphics.

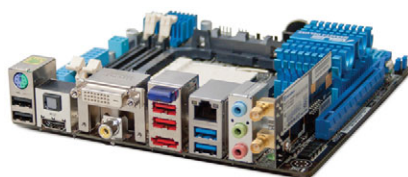
Other features include DTS Surround Sensation UltraPC, which delivers 5.1 surround-sound post-processing, as well as a physical MemOK! button on the motherboard itself, which lets you easily check memory boot compatibility. Considering the form factor of the M4A88T-I, the board also sports a surprising array of overclocking tools and options. In the BIOS, virtually anything and everything that can be unlocked for overclocking is. Further, a few OC features—the Turbo Key II, which automatically overclocks

the CPU, and the Core Unlocker—each have a physical switch on the motherboard.

The M4A88T-I Deluxe doesn't have all the bells and whistles of a bigger

board, but it's an impressive little fellow considering the applications for which it's designed. ■

BY SETH COLANER



M4A88T-I Deluxe

\$124.99

Asus | www.asus.com

	MSI 890GXM- G65	ASRock 890GX Extreme4	Gigabyte 880GMA- UD2H	Asus M4A88T-I Deluxe
Strictly Scores				
3DMark Vantage				
Overall	P8847	P8898	P8825	P7136
GPU	7733	7801	7723	7779
GPU Test 1	23.65	24.11	23.77	23.77
GPU Test 2	21.61	21.55	21.44	21.77
CPU	15581	15386	15432	5720
CPU Test 1	2008.08	2000.37	1982.6	726.83
CPU Test 2	24.37	23.63	24.29	9.21
PCMark Vantage Pro				
Overall	11737	11438	10909	7758
Memories	7263	7270	7447	6447
TV And Movies	4653	4684	4732	3373
Gaming	12684	12412	12950	10062
Music	14646	14504	14902	11087
Communications	8963	9219	8754	7040
Productivity	15529	14776	15049	11734
HDD	17706	18433	19143	19964
POV-Ray 3.7*				
	4308.74 PPS	4313.14 PPS	4324.31 PPS	1595.37 PPS
Cinebench 11.5				
CPU**	5.33	5.35	5.29	1.96
SiSoft Sandra Lite 2010c				
Processor Arithmetic				
Dhrystone ALU (GIPS)	63.73	64	64	23.23
Whetstone iSSE3 (GFLOPS)	51.67	51.88	51.79	19
Processor Multi-Media				
Integer x16 aSSE2 (Mpixels/s)	208.11	209.11	209.17	75.88
Float x8 iSSE2 (Mpixels/s)	127.82	128.74	128.4	47.2
Double x4 iSSE2 (Mpixels/s)	69.88	70.2	70.23	25.73
Memory Bandwidth				
Integer Buffered iSSE2 (GBps)	12	12.1	12	10.68
Float Buffered iSSE2 (GBps)	12	12.1	12	10.68
Dirt 2 (8XAA)				
	25.3	25.6	25.3	25
S.T.A.L.K.E.R.:				
	7	7.1	7	7.1
Call of Pripyat (4XAA)				

* pixels per second

**points

Games tested at 2,560 x 1,600

Test system specs: CPU: AMD Phenom II X6 1075T (3GHz); RAM: 2GB OCZ DDR3-1333; Graphics: ATI Radeon HD 5850; Storage: 128GB Kingston SNVP 325 SSD; Operating System: Windows 7 Enterprise (64-bit)

Test system specs (Asus M4A88T-I Deluxe): CPU: AMD Phenom II X2 560 (3.3GHz); RAM: 2GB Hynix DDR3-1333 (SO-DIMMs); Graphics: ATI Radeon HD 5850; Storage: 128GB Kingston SNVP 325 SSD; Operating System: Windows 7 Enterprise (64-bit)



Dual Intelligent Processors 2

DIGI+ VRM

DIGI+ VRM Digital Motherboard Power Design Marks Big Departure from Analog Technology

Working to bring the future of power management to PC users today, ASUS integrates its revolutionary and precise DIGI+ VRM technology in a wide range of motherboard offerings.

Intelligent Power Design Right on Board

Digital power design from ASUS has been introduced in server board models, but following the enthusiastic reception it's received from media and users, the new standard has now been implemented in a much broader range of mainstream motherboards. It continues ASUS' long tradition of innovation and leadership in the market, which in this case is through a design that completely revitalizes PC power management. Comprising digital hardware with precision controls, DIGI+ VRM works to establish a new standard that's a huge improvement over existing analog power systems.

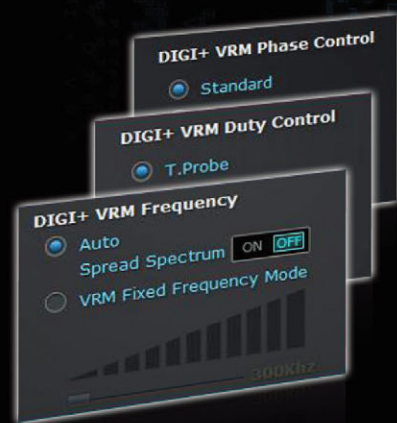
DIGI+ VRM is an innovative, industry-leading technology that takes Intel VRD 12 architecture and greatly enhances it to go far beyond the limits of analog designs. It features a programmable microchip with a digital architecture, so there's no power conversion and therefore no latency, resulting in improved efficiency, faster response, and greatly augmented performance.

2X More Precise Than Analog

When put next to analog systems, the benefit of DIGI+ VRM truly stands out. First of all, it offers much greater flexibility and faster system response times, so adjustments to voltages can be drastically more accurate and safer to implement. While analog power management has evolved a long way, it still has a limited range when it comes to fine adjustments, leading to reduced tolerances as changes have to be made in more unrefined, larger increments.

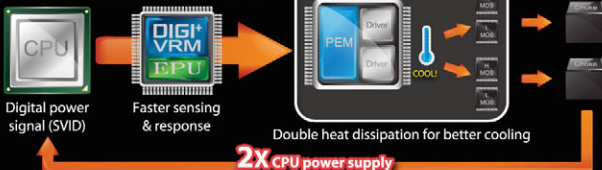
The better stability DIGI+ VRM enables translates into a bigger overclocking potential. The ability to adjust phase performance manually increases the flexibility of the entire system, and from our own experience, Dual Intelligent Processors 2 with DIGI+ VRM offers about twice the on-demand power precision of traditional analog designs. It allows a PC to reach its full performance potential, making it easy for users to harness its capabilities through diverse but easy to use BIOS settings, or via the dedicated and exclusive user interface.

Combined with the use of thermally-tuned materials on ASUS motherboards, DIGI+ VRM's efficient power design balances power phase loadings by detecting VRM temperatures to promote longer component lifespan, better cooling and greater system stability. Learn more at USA.ASUS.com



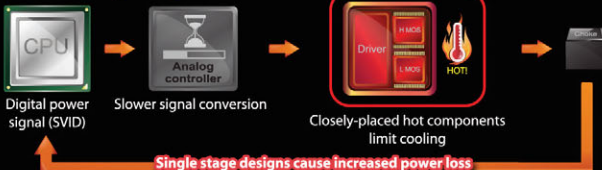
▲ Exclusive ASUS user interface allows easy fine tuning of system performance via diverse settings

ASUS Exclusive Digital Power



In addition to doubling power precision, DIGI+ VRM minimizes power loss and maximizes power efficiency. Its specially-tailored digital controller optimizes switching performance and reduces power latency exponentially, so users benefit from a much more effective power management architecture.

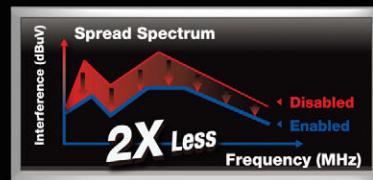
Other Analog Design



Lower Radiation and Temperatures

With DIGI+ VRM digital architecture, frequencies are varied dynamically by enabling VRM spread spectrum, resulting

in the electromagnetic interference emitted by the motherboard being cut in half, so different parts of the system don't clash with each other. Coupled with real time reduction of CPU Vcore power noise, this vastly improves system stability thanks to lower cross-talk between different components, plus it makes for a much safer and healthier computing environment for all users.



ASUS – The World's Best-Selling and Most Award Winning Motherboards.

Memory Gain

Core i7 RAM Comes In Threes

RAM has always been a popular upgrade. Now, however, consumers are finally embracing 64-bit computing in large numbers, arguably thanks to Windows 7 and attractive pricing on 4GB complements of memory. Average users are getting the message that in order to make use of 4GB or more RAM, they can no longer use 32-bit OSeS (nor even 64-bit WinXP).

You've probably been long aware of (and long awaiting) the uptick in 64-bit uptake. And you're glad to see that it's spurring a few software developers to upgrade their apps and games to take advantage of the 4GB, 6GB, or more on tap. More to the point, you're ecstatic to see low-voltage DDR3 fulfill its promise to clock ever higher.

Thankfully, pricing is on your side right now. DDR3 is much cheaper than DDR2 these days. (There's little of the latter being made anymore.) Also, says David Leong, PR manager at Kingston Technology, "In general, DRAM prices continue to go down, as we're in a bit of an oversupply situation."

With a secondary PC, perhaps you add RAM capacity as a mainstream user does: by plugging in a new or hand-me-down DIMM as needed. For your primary system, however, you probably prefer to install RAM in matched sets, the better to take advantage of multichannel addressing and the moderate speed boost that comes with it.

A multichannel memory controller is able to read from and write to two or three DIMMs simultaneously when dual- or triple-channel addressing (also called ungang mode) is enabled in the motherboard's BIOS. AMD and Intel chips support dual-channel mode, but the only desktop platform currently capable of using triple-channel RAM is Intel's illustrious Core i7 processor. The Core i7 remains the dominant force in consumer CPU performance, so it all but dictates the contents of a high-end set of RAM sold by a competitive vendor.

The Core i7 influences DDR3 manufacturers in another way, namely with the maximum voltage level of its integrated memory controller. RAM running at slower clock frequencies tends to stick to the DDR3 standard's stock 1.5V voltage level, but faster sets of memory marketed toward power users usually list a 1.65V rating among their specs.

"Anything over 1.5V for [DDR3] memory is considered overclocking," says an Intel motherboard engineer via PR manager Dan Snyder.

In this article, we kick the tires on some triple-channel DDR3 kits at a variety of speed ratings, capacities, and prices. After all, paying for a Core i7 means there's less money in your budget for other important components, so you'll no doubt appreciate RAM with bang for the buck.

How We Tested

Our two-pronged testing approach involved benchmarks measured synthetically (bandwidth and latency) and in a more real-world way (frames per second in a repeatable game sequence with the processing onus on the CPU and RAM subsystem).

For the former, we used SiSoftware's Sandra Lite 2011b. For the latter, we turned to an oldie but goodie: the 64-bit Crysis CPU Benchmark. This completes four test runs, the best three of which gave us useful average frames per second ratings.

Our test PC had a Gigabyte GA-X58-USB3 rev. 1.0 mainboard. It carried an Intel X58 Express/ICH10R chipset and the latest non-beta BIOS version. Helming the vessel was a watercooled "Gulftown" Core

i7-980X Extreme six-core processor running at 3.33GHz. Also on board were Win7 64-bit Enterprise, a Sapphire Radeon HD 6850 1GB Toxic Edition graphics adapter, a Patriot Zephyr 128GB SSD boot drive, and an Antec TruePower Quattro 1,200W PSU. We ran all tests with the computer case open, which allowed us to gauge DIMM temperatures under load using an infrared thermometer.

We used the Gigabyte mainboard's BIOS to adjust all memory settings, such as timings (CAS-TRCD-TRP-TRAS). In all cases, we set the board's memory Performance Enhance setting to Standard (off) for predictability and stability.

We also overclocked each set of memory, even though OCing RAM is the epitome of the old saying, "Your mileage may vary." Overclocking results let speed freaks steal a look at each kit's performance potential, but they also give users with no intention of running their RAM out of spec an idea of the kind of headroom a particular pack of memory might bring with it. For example, if a memory set rated for 2,000MTps (mega-transfers per second, reflecting the effective MHz of a quad-pumped DIMM) can run comfortably at 2,133MTps, you'll know that it's not running on the ragged edge at its stock speed. Vendors use memory chips from the upper speed bins to build their modules with higher ratings, but sometimes a conservatively rated dual- or triple-channel kit can surprise you with its overclockability.

A word of caution on reading too much into our benchmark results: Adjusting memory speeds on our Core i7 test platform often necessitated raising or lowering the CPU multiplier to keep its clock speed near its 3.33GHz nominal baseline. Gigabyte supplied excellent access to settings in its motherboard BIOS, but they weren't quite granular enough to hit particular frequencies or voltage levels in every case. Therefore, our test results reflect not only differences among



Premier ADU1333B2G9-TRH

Price unavailable

Adata | www.adatausa.com

Specs: Capacity: 6GB (3 x 2GB); Speed: PC3-10666 (1,333MHz); Timings: 9-9-9-25, 1T; Voltage: 1.5V

the sets of RAM in this review but also slight variations in processing speed, as well. Long story short, don't base your purchasing decision solely on our test results.

Adata Premier ADU1333B2G9-TRH

This is a special case—sort of a “last chance to see” scenario. Adata told us just before press time that it's phasing out its triple-channel sets, like this one, because it expected to sell more than it has. (Adata is still going to produce dual-channel DDR3 kits.) In fact, the company didn't even want to give us a suggested retail price for the ADU1333B2G9-TRH set.

So why bother reading about a 1,333MHz kit you'll have to hunt for online? Maybe because our sample was a surprisingly good overclocker: We reached 1,867MHz on nearly stock timings.

Overclocking this far took a DDR voltage bump. How much of a bump, we don't know, as we leapt straight for our PC's de facto maximum of 1.64V to save time. (Normally we'd opt for Intel's 1.65V maximum spec, but our motherboard's 0.02V increments put the next step beyond the pale at 1.66V.)

Our OC also required a system memory multiplier increase to 14X, plus a slight timing tweak to 9-9-9-27-2T. This Adata RAM didn't come with any XMP profiles, which can reduce the number of BIOS settings you need to change should you want to squeeze out a bit more performance than the stock SPD default settings supply.

(Note that increasing the voltage to the QPI [QuickPath Interconnect] system is part and parcel of the Intel Core i7 overclocking repertoire, and indeed, part of some XMP profiles. Our Gigabyte motherboard, however, wasn't that type of board. It didn't even want to boot unless we kept the QPI voltage at its stock 1.2V setting at all times. And so we did throughout all of our testing.)

As ever, time was short. With 1,867MHz running stably, we quit while we were ahead, leaving the Premier kit's actual limits a mystery. Still, that's a 40% frequency leap—a resounding OC success by any definition—and at reasonable temperatures to boot.

This 3 x 2GB kit has simple but nice-looking blue heat spreaders. Each module approximates standard height at 1.4 inches tall, and should clear most heatsinks. Like the rest of the DDR3 kits here, this Adata memory was unbuffered and non-ECC.

ADU1333B2G9-TRH comes with a free 60-day trial of Symantec Norton Internet Security, along with a lifetime warranty.

Corsair Vengeance CMZ12GX3M3A1600C9

Corsair has long been a reliable source of parts that perform admirably. That said, its enthusiast products have never been on the inexpensive side.

The Vengeance family of enthusiast memory is part of Corsair's recent value initiative. It's intended to supply good-looking RAM with nice OC headroom at a low price.

Part of Vengeance's cost savings comes in the form of stamped heat spreaders instead of extruded ones. Each spreader's fins are hollow instead of solid, which allows for more air access to the top edge of the DIMM. There are honeycomb stickers here and there for some visual punch. All told, the modules are 2 inches tall, so plan accordingly if you're using a third-party processor heatsink.

This RAM actually had two XMP profiles in its SPD information. Curiously, both were exactly the same. In any case, the memory ran reliably and overclocked well, especially considering its low price. There's also the Corsair limited lifetime warranty.

This memory kit showed up on deadline day, so we had even less time to tinker with it than the others. Therefore, our overclocking

efforts began and ended with a suggested list of settings in Corsair's reviewer guide.

To hit the specified 2,000MTps with the partial recipe provided, we hopped up the CPU's base clock to 143MHz and boosted the system memory multiplier to 14X. We adjusted the RAM voltage to 1.64V and the timings to 9-10-9-24-2T. Finally, we dropped the CPU multiplier to 23X (3.28GHz). The Vengeance ran like a champ and may even have had some speed left in reserve.

And, oh yeah, lest we forget: This is 12 gigabytes of RAM. For a desktop computer. Yes, we're aware that there are 16GB and 24GB kits on the market, and that there are perfectly legitimate uses for all those rows and columns. Still, it's enough to make an aging weirdy beardy shake his head in wonder.

We know Bill Gates didn't actually say it, but whatever happened to 640KB being “enough for anybody”?

Kingston HyperX Fan Kit KHX2250C9D3T1FK3/6GX

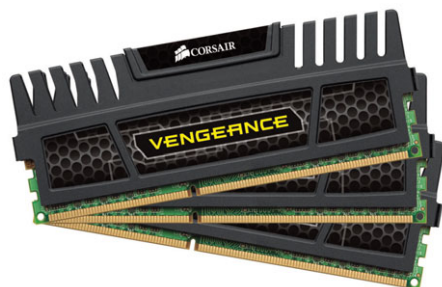
Here's a kit that would be right at home in a watercooled system. Bold, blue, and beautiful, this RAM comes with an attractive fan assembly, so it doesn't need the breeze from a CPU heatsink blower to keep it cool. And actually, with a 2.4-inch module height, you're not going to be able to wedge these DIMMs under a tower cooler in the first place.

Our test PC's BIOS didn't seem to mind XMP profiles. We mean that in a couple of ways. The BIOS didn't block XMP profiles from being enacted, and yet it also didn't completely obey the profiles' timings and other settings, either, according to system info utility CPU-Z.

Still, by entering values by hand, we were able to duplicate the profiles as stated in the memory's SPD information revealed in CPU-Z. XMP Profile 1's results are listed in the chart; Profile 2, at 2,002MTps and slightly more aggressive timings, returned roughly similar results with less latency.

At XMP profile settings, we tested without Kingston's included fan assembly. It would have blocked our infrared thermometer's line of sight to the RAM's heat spreaders, so we left it off for the moment.

When we started to overclock, of course, we bolted the crisp, blue, aluminum fan



Vengeance CMZ12GX3M3A1600C9

\$249.99 (online)

Corsair | www.corsair.com

Specs: Capacity: 12GB (3 x 4GB); Speed: PC3-12800 (1,600MHz); Timings: XMP 9-9-9-24, 2T; Voltage: 1.5V

assembly together over the DIMMs. Aglow in azure, the extra cooling could add some longevity to the modules over time, if not additional overclocking headroom. The extra breeze probably won't hurt nearby motherboard components, either.

As it turned out, even with the clip-on fans, our sample's performance ceiling was just a short hop from its XMP Profile 1 settings. We clocked the RAM up to 2,288MTps, a scant 32MTps increase, by nudging the BCLK to 143MHz. This necessitated doubling the command rate setting to 2T, however, and loosening the other major timings to 10-11-10-30. And this, like getting a raise that moves you up into the next tax bracket, proved to be one step forward, two steps back from a benchmark perspective.

Overclocking in our sample's case didn't prove worth the effort, but again, your mileage will vary. Looked at another way, Kingston dialed in this RAM's top XMP Profile just about perfectly. And its fan assembly acts as a measure of insurance against heat-related instability.

The memory comes with a lifetime warranty; the fan gets one year. And at press time, Newegg's \$172.99 price looked much better than the official MSRP of \$269.

OCZ Reaper HPC OCZ3RPR2133LV12GK

Put your sinks in the air like you don't care. . .

Each module is 2.9 inches tall thanks to its racetrack-shaped HPC. The heatpipe conduit is made of copper, plated in nickel, and fortified with continuously boiling and condensing liquid. Lastly, it's encased in an auxiliary heatsink separate from the main heat spreaders clamped onto the DIMM.

As you can imagine, this beefy passive cooling assembly helps to keep these three RAM modules trustworthy at high clock speeds. The 12GB set overclocks a bit, but bear in mind that it's already rated above 2.1GHz out of the box. You're getting a matched set of 4GB DIMMs that work together well enough to merit such high stock ratings, let alone any performance level beyond them.

After much trial and error, we settled on a top speed of 2,272MTps for the Reapers.



HyperX Fan Kit KHX2250C9D3T1FK3/6GX

\$172.99 (online)

Kingston | www.kingston.com

Specs: Capacity: 6GB (3 x 2GB); Speed: PC3-18000 (2,250MHz); Timings: XMP Profile 1: 9-11-9-27, XMP Profile 2: 9-10-9-27; Voltage: 1.65V

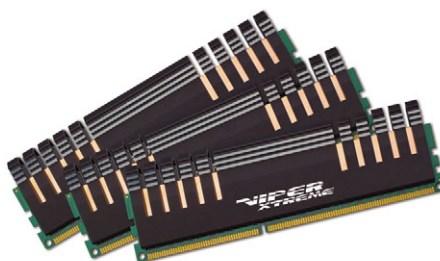


Reaper HPC OCZ3RPR2133LV12GK

\$535

OCZ | www.ocztechnology.com

Specs: Capacity: 12GB (3 x 4GB); Speed: PC3-17000 (2,133MHz); Timings: 10-10-10-30, 1T; Voltage: 1.65V



Viper Extreme PX736G2000ELK

\$199.99 (online)

Patriot | www.patriotmemory.com

Specs: Capacity: 6GB (3 x 2GB); Speed: PC3-16000 (2,000MHz); Timings: XMP 9-10-9-27, 2T; Voltage: 1.65V

This happened with a 1.64V memory power setting, a BCLK of 142MHz, and somewhat roomier 11-11-11-30-2T timings. We stipulated a 23X CPU multiplier for an effective processor frequency of 3.26GHz. After benchmarking, however, we decided that we would rather reduce settings once again until we could tighten the timings for better application performance, were we to run this RAM in one of our own PCs.

OCZ blesses its Reapers with a lifetime warranty. Online pricing wasn't available for this kit at press time, although we did locate the PC3-16000 version for \$487.

Patriot Viper Extreme PX736G2000ELK

This Patriot 6GB package is noticeably more expensive than the others, most likely because of the 6 grams of copper the vendor builds into the core of each DIMM. Combined with an extruded aluminum heat spreader with tastefully gabled fins, the copper assists in dispersing heat away from the silicon DDR3 chips.

As a result, the Viper Extreme set is able to reach the 2GHz timberline with a CAS 9 timing intact. That's its résumé's lone XMP profile, by the by. We still had to tweak the timings and voltage, as ever, to keep the BIOS' Auto settings from overruling the XMP profile's specifications.

Next, we used the XMP profile as a jumping-off point for our journey of overclocking discovery. The kit proved to be capable of 2,072MHz with a BCLK of 148MHz, a 1.64V voltage, and a 14X system memory multiplier. Even with relaxed timings of 10-10-10-30-2T, the overclock gained us some traction in all of our benchmarks, which was also influenced by the 3.4GHz clock speed and 23X multiplier pushing the CPU.

Together with its heatsink, each Viper DIMM is 1.6 inches tall. Patriot backs the trio with a lifetime warranty.

PNY XLR8 MD6144KD3-1600-X8

PNY makes things interesting with this wallet-friendly brace of RAM. This XLR8 set trades high clock frequencies for low

latency. It puts us in mind of our penchant for ultra-responsive CAS2 DDR back in the day, while many of our contemporaries bought only sticks they could clock up (and mainboards that would let them).

This RAM has rather plain heat spreaders, but they're nicely anodized in black and emblazoned with the dashing XLR8 and PNY logos. The clip-ons are ventilated along the top edge, which we like. And they add just a tenth of an inch to the modules' 1.2-inch height, making these XLR8s installable wherever there's room for a DDR3 stick.

This bargain kit actually overclocked fairly well. A simple system memory multiplier bump to 14X put the DIMMs at 1,867MHz with no other changes. Finally, with a base clock of 138MHz and a CPU multiplier of 24X (3.31GHz), we found stability at 1,932MTps with 10-10-10-30-2T timings.

Although this overclock netted us bandwidth and latency improvements in the synthetic Sandra benchmarks, it also lost us several frames per second in the real-world

XLR8 MD6144KD3-1600-X8

\$129.99 (online)

PNY | www.pny.com

Specs: Capacity: 6GB (3 x 2GB); Speed: PC3-12800 (1,600MHz); Timings: XMP 8-8-8-24, 2T; Voltage: 1.65V



Crysis CPU test. That's why, should you choose to turbocharge your RAM past its rated specs, you should always test its pre- and post-OC performance in the real-world apps and games you run most often.

Size Matters

One more message: Before you buy new memory for a Win7 system, don't forget that the OS likes to peg the size of the swap file on the hard drive or SSD to the capacity of the RAM. In other words, if you install 12GB of memory, Win7 will want to reserve 12GB of drive space for the paging file.

This can be an issue if you're using a 32GB or smaller SSD as a boot volume,

as you can easily run out of space on the C: drive. Workarounds include shrinking the space for the Recycle Bin and System Restore points, moving the default save locations for libraries such as My Documents off-drive, and, of course, moving the swap file to another drive (preferably solid-state, as well).

Finally, don't forget to return your BIOS to its default memory settings before you remove your old RAM and install the new. Soon you'll enjoy the performance and responsiveness your new DDR3 brings to the table. ▲

BY MARTY SEMS

Benchmark Results

We tweaked all RAM settings in the BIOS, attempting to keep the CPU at or near its nominal 3.33GHz clock frequency and maintaining QPI at its stock 1.2V level. MTps (megatransfers per second) represents DDR3's quad-pumped data transfer effect as applied to the RAM's operating frequency in MHz. Sandra's Aggregate Memory Performance score averages its Integer and Floating Point Buffered iSSE2 Bandwidth test results, which in all cases were nearly identical. We recorded temperatures with a Ryobi CW 1005 infrared thermometer.

	Adata ADU1333B2G9-TRH		Corsair CMZ12GX3M3A1600C9		Kingston KHX2250C9D3T1FK3/6GX		OCZ OCZ3RPR2133LV12GK		Patriot PX736G2000ELK		PNY MD6144KD3-1600-X8	
Capacity	6GB		12GB		6GB		12GB		6GB		6GB	
Price	n/a		\$249.99		\$172.99		\$535 (MSRP)		\$199.99		\$129.99	
Settings	SPD: 1,333MTps CAS 9	OC: 1,867MTps CAS 9	XMP Profile: 1,600MTps CAS 9	OC: 2,000MTps CAS 9	XMP Profile 1: 2,256MTps CAS 9	OC: 2,288MTps CAS 10	SPD: 2,133MTps CAS 10	OC: 2,272MTps CAS 11	XMP: 2,000MTps CAS 9	OC: 2,072MTps CAS 10	XMP Profile: 1,600MTps CAS 8	OC: 1,932MTps CAS 10
Sandra Lite 2011b												
Aggregate Memory Performance (GBps)	18.89	21.65	19.83	22.82	23.13	22.84	21.68	22.26	22.7	23.13	20.17	22
Access Latency (ns)	71.5	63.2	69.2	61.7	58.2	58.9	62.1	61.5	61.4	61.1	66.2	63.8
Crysis 64-bit CPU Benchmark 800 x 600 (avg fps)	98.84	101.24	105.73	98.05	104.1	102.23	104.97	99.87	101.33	104.6	103.58	100.45
Temp as tested (degrees C)	38.9	39.3	38.6	39.5	40.1*	n/a	42.2	45.4	40.1	39.5	40.1	41

* Without included fan.

Logitech Revue

Last night, I stood next to the plasma over my fireplace and helped coach my kids through math videos at Khan Academy (www.khanacademy.org). My 5-year-old remarked, "This is *way* better than using the little notebook!" That's the power of Logitech's Revue. There's something about the Google TV experience, how it optimizes Web browsing in Chrome for a simple 10-foot UI while keeping TV programming just one tap away: It's a simple, effective, and long-awaited answer for everyone who doesn't have an HTPC.

The Revue is an Intel Atom platform wrapped in a glossy enclosure about the size of a hardcover book, linked to your TV and wirelessly connected to Logitech's included keyboard/trackpad/remote. Unlike most keyboard remotes, you can

type on this one comfortably. The idea is that Logitech's box connects to the Internet and overlays the Google TV platform on top of your existing TV service.

The Chrome browser is presented as one of several apps alongside Amazon Video On Demand, Netflix, Twitter, and others. Until the Google TV app store opens up in early 2011, what you see is what you get. The bundled apps are OK, but not stunning. For instance, Netflix is vastly better on the Xbox 360. Without Hulu on Google TV, networks (ABC, NBC, etc.) need to deliver their own show apps, because streaming episodes through Chrome is not optimal.

After two weeks, I was mostly using the Revue for simple Web surfing, Netflix, Pandora, YouTube, and Google Docs. The browser's method of tabbing windows is rather clumsy, and Logitech's Media Player app needs major cosmetic help. When the Revue can search my LAN for media content

and play it with one click, then we'll have arrived. Logitech tells me it's working on that.

Still, the Revue is by far the best living room convergence option I've seen for the mainstream. ■

BY WILLIAM VAN WINKLE



Revue

\$299.99

Logitech

www.logitech.com

Specs: Video: 1 HDMI 1.3a input, 1 HDMI 1.3a output; Audio: 1 optical SPDIF; 2 USB 2.0 ports; Networking: 10/100 Base-T Ethernet, 802.11n; Integrated Harmony Link IR blaster

Buffalo MiniStation Cobalt USB 3.0 500GB

Currently, the lowest online price for a 500GB Cobalt USB 3.0 is \$74.99 after shipping—less than \$10 more than the USB 2.0 version. For a close comparison, we grabbed a USB 2.0 Western Digital My Passport and tested both drives on a Gigabyte X58/Intel Gulftown platform, doing read and write tests on both a 3.93GB folder of 29 files, a single 3.75GB MPEG-4 video, and PCMark Vantage's HDD Suite test. We also used a discrete NEC-based USB 3.0 controller. The difference between the two drives is substantial, with the Cobalt outstripping the USB 2.0 WD unit by roughly 100% on file transfers.

We next ran the same tests on a WD My Book 3.0. The benefits of having a 3.5-inch drive in play compared to either 2.5-inch drive in the portable are clear, especially in the PCM Vantage results, although the difference isn't as pronounced as the move from USB 2.0 to 3.0.

Buffalo advertises that the Cobalt can be accelerated via its bundled TurboPC application, which tries to push some load

off onto system memory. This helped in three of our four transfer tests, although TurboPC did prevent PCMark from completing its HDD test suite.

At under \$80, the MiniStation Cobalt is aesthetically plain but impressively fast, spacious, affordable, and still backward-compatible with USB 2.0 ports. Unless you plan on losing the bundled USB 3.0 cable, you'd be foolish to still consider a poky USB 2.0 drive near the same price. ■

BY WILLIAM VAN WINKLE



MiniStation Cobalt USB 3.0 500GB

\$94.99

Buffalo | www.buffalotech.com

Specs: Dimensions: 3.4 x 5.0 x 0.6 inches (HxWxD); Capacity: 500GB Weight: 6.5 oz.; Internal interface: SATA; Max. specified transfer rate: 5Gbps.; Power: 2.5W maximum

Benchmark Results		3.93GB folder	3.75GB file	PCM Vantage HDD
Buffalo MiniStation Cobalt 3.0	write	1:20	0:56	3088
	read	1:16	0:51	
Buffalo MiniStation Cobalt 3.0 w/TurboPC	write	0:55	0:52	N/A
	read	0:54	1:13	
Western Digital My Passport	write	2:26	2:15	1951
	read	2:23	1:52	
Western Digital My Book 3.0	write	1:05	0:44	5031
	read	0:39	0:37	

All times in (minutes:seconds).

Tt[®] eSPORTS

By Thermaltake

AVAILABLE NOW



"Challenge is the game" highlights the philosophy to bring out gamers' addiction in gaming excitement and the ambition of reaching to the extreme. **Tt eSPORTS**, a gaming obsession division from Thermaltake, is uniting gamers from all over the world in a unique & fascinating eSPORTS

Like us on facebook.com/TteSPORTS



Official professional e-SPORTS gaming gear for
2010 WCG Worldwide

CHALLENGE IS THE GAME

WWW.TTESPORTS.COM

MICRO CENTER

newegg

COMPUSA

Walmart
Save money. Live better.

amazon.com
and you're done.

TigerDirect.com

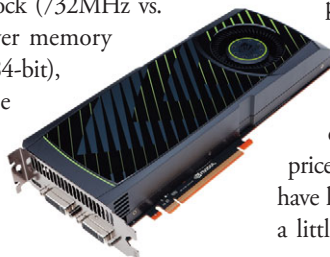
CDW

Nvidia GeForce GTX 570

Last month, we looked at the GeForce GTX 580, which showed Fermi's true potential. The new GeForce GTX 570 has the same GF110 at its core, albeit with one of the full 16 SMs fused off to match the 480 CUDA cores of the GTX 480. Despite the similarities, there are a few notable differences between the GTX 570 and GTX 480, including the newer card's faster core clock (732MHz vs. 700MHz), narrower memory bus (320-bit vs. 384-bit), and smaller frame

GeForce GTX 570

\$349 | Nvidia
www.nvidia.com



Specs: GPU: GF110; Core clock: 732MHz; Memory: 1.25GB GDDR5 (950MHz); 480 CUDA cores; 60 texture units; 40 ROPs; TDP: 219W

Test system specs: CPU: 3.33GHz Intel Core i7-980X EE; Motherboard: Gigabyte GA-X58-USB3; RAM: 6GB Patriot Sector 7 DDR3; Storage: 128GB Patriot Zephyr SSD; PSU: Antec TruePower Quattro 1,200W

buffer (1.25GB vs. 1.5GB). The 570 has the same number of texture units (60) but fewer ROPs (40). But thanks to the GF110's architectural enhancements, this card performs very similarly to the GTX 480.

The GTX 570 shares the GTX 580's PCB, vapor-chamber cooler, and heatsink shroud. There are two 6-pin PCI-E power connectors on the top of the card, as well as a pair of DVI ports and a mini HDMI port.

In our tests, the GTX 570 has enough going for it to unseat the GTX 480, and it brings this level of performance at a significantly lower price. Now that AMD's Radeon HD 6900s have launched, however, the GTX 570 loses a little of its value luster. That being said,

if Nvidia's value adds like PhysX and 3D Vision appeal to you more than AMD's Eyefinity, then you won't regret purchasing the GTX 570. ■

BY ANDREW LEIBMAN

Scores & Specs	Nvidia GeForce GTX 570
3DMark 11 Performance	
Overall	P5261
Graphics Score	4953
Physics Score	8286
Combined Score	4868
Graphics Test 1 (fps)	21.72
Graphics Test 2 (fps)	22.75
Graphics Test 3 (fps)	31.56
Graphics Test 4 (fps)	15.62
Physics Test (fps)	26.31
Combined Test (fps)	22.65
Games	2,560 x 1,600
Left 4 Dead 2 (8XAA, 16XAF)	73.88
S.T.A.L.K.E.R.: CoP (4XAA)	23
Aliens vs. Predator (4XAA)	22.3
Driver: ForceWare 263.09	

AMD Radeon HD 6950

AMD's Cayman Pro, better known as the Radeon HD 6950, is finally here, but was the wait worth it? Boasting 2.25 TFLOPs of raw compute power, the GPU beneath the large dual-slot heatsink shroud of the Radeon HD 6950 features 22 SIMDs, for a total of 1,408 stream processors, or ALUs as AMD is referring to them now. All told, there are 88 texture units, 32 ROPs, and 2GB GDDR5 running over a 256-bit bus.

Although the core and memory

Radeon HD 6950

\$299 | AMD
www.amd.com



Specs: GPU: Cayman Pro; Core clock: 800MHz; Memory: 2GB GDDR5 (1,250MHz); 1,408 Stream Processors; 88 texture units; 32 ROPs

Test system specs: CPU: 3.33GHz Intel Core i7-980X EE; Motherboard: Gigabyte GA-X58-USB3; RAM: 6GB Patriot Sector 7 DDR3; Storage: 128GB Patriot Zephyr SSD; PSU: Antec TruePower Quattro 1,200W

clocks are set to 800MHz and 1,250MHz, respectively, AMD's new PowerTune feature dynamically adjusts those clocks to enforce the card's 200-watt power limit. In practice, this means that your graphics card will only throttle up to the max clocks if the task at hand requires it. Considering the capabilities of high-end GPUs these days, and the dearth of games capable of pushing them, this is a welcomed feature. You can also use the Catalyst Control Center to raise this threshold, but do it at the peril of your warranty. According to AMD, typical gaming and idle power is 140W and 20W, respectively.

At \$300, the Radeon HD 6950 has no real competition from Nvidia. True, the GeForce

GTX 570 is faster, but it also costs \$50 more. With a standard 2GB frame buffer, we find the Radeon HD 6950 especially compelling for higher-resolution gaming and Eyefinity. ■

BY ANDREW LEIBMAN

Scores & Specs	AMD Radeon HD 6950
3DMark 11 Performance	
Overall	P4759
Graphics Score	4372
Physics Score	9133
Combined Score	4522
Graphics Test 1 (fps)	19.02
Graphics Test 2 (fps)	22.7
Graphics Test 3 (fps)	28.44
Graphics Test 4 (fps)	12.72
Physics Test (fps)	29
Combined Test (fps)	21.04
Games	2,560 x 1,600
Left 4 Dead 2 (8XAA, 16XAF)	74.95
S.T.A.L.K.E.R.: CoP (4XAA)	19.59
Aliens vs. Predator (4XAA)	22.2
Driver: Catalyst 10.11	

PLAY HARD WITH A

VENGEANCE

Introducing

Corsair Vengeance™ Memory

Brilliantly designed to deliver performance, compatibility and stability.

Designed for *PERFORMANCE*

Using only carefully selected DRAM and performance screening each module, each Vengeance memory kit is tuned to deliver fantastic performance and value. Its unique heat spreaders not only look cool, they keep your memory cooler too, making them a great choice for overclocking. And all Vengeance memory kits are compatible with Corsair Airflow fans.

Designed for *COMPATIBILITY*

Vengeance modules run at 1.5V for maximum compatibility with all Intel Core i3, i5 and i7 processors, as well as AMD's full range of Phenom II processors. Vengeance modules also include an XMP profile so it's easy to get maximum memory performance from your system.

Designed for *STABILITY*

Like all high-performance memory from Corsair, Vengeance modules undergo rigorous testing before being assembled, ensuring you'll get rock-solid stability out of the box. Plus, Vengeance is backed by a limited lifetime warranty and Corsair's legendary service and support.



Corsair Vengeance memory. Designed for you. Learn more at corsair.com

WE'VE DESIGNED A COMPLETE LINE OF ENTHUSIAST-GRADE COMPONENTS AND ACCESSORIES TO MAKE YOUR NEXT PC YOUR BEST PC



CASES



POWER SUPPLIES



COOLING



USB DRIVES



GAMING AUDIO

OCZ RevoDrive X2 240GB

OCZ has been blazing a trail with PCI-E-based SSDs for some time now—from its first-gen Z-Drive products to the new RevoDrive lineup. The latter sports a more refined custom PCB, a combination of SandForce controllers, and a rather mature hardware-based RAID controller from Silicon Image. The new RevoDrive X2 is based on a quartet of SandForce 1200 controllers and four 60GB SSDs. It is built on Intel NAND flash and—you guessed it—offers up to four times the bandwidth of a single SATA SSD, all in a single PCI-E x4 slot.

The OCZ RevoDrive X2 utilizes an onboard SiI 3124 RAID controller with a hardware RAID engine to bring the four SSDs together in RAID 0. The total capacity of the drive I tested is 240GB, with 223GB accessible once formatted with an NTFS Windows partition. The drive doesn't support the Windows 7 TRIM command due to its RAID configuration, though OCZ managed to pass along SandForce's excellent background garbage collection algorithm to

keep the drive running in top condition over time. You can also use the RevoDrive X2 as a boot drive, as well, which can't be said for all PCI-E-based SSDs.

With an MSRP of \$619, which puts the 240GB RevoDrive X2 on price parity with standard SATA SSDs of similar capacities, it's hard not to recommend this amazingly fast little slab of silicon storage goodness. Check the benchmark numbers and be prepared to drool. ■

BY DAVE ALTAVILLA



RevoDrive X2 240GB

\$619 | OCZ

www.ocztechnology.com

Benchmark Results OCZ RevoDrive X2 240GB

CrystalDiskMark*

Sequential read	648.2
Sequential write	362.2
512KB read	546.1
512KB write	352.2
Random read (4KB, QD1)	20.78
Random write (4KB, QD1)	76.68
Random read (4KB, QD32)	320.2
Random write (4KB, QD32)	259.8

Iometer

Workstation Access Pattern (IOPS)	52,172
Database Access Pattern (IOPS)	66,947

SiSoft SANDRA Physical Disk Test*

Read performance	713.5
Write performance	593

*Results in MBps.

Specs: Capacity: 240GB (223GB formatted); Maximum read/write (advertised): 740MBps/720MBps; Sustained write (advertised): 600MBps; MTBF: 2 million hours; Three-year warranty

Test system specs: CPU: Intel Core i7-970; Motherboard: Gigabyte GA-EX58 Extreme; GPU: Nvidia GeForce GTX 285; RAM: 6GB Kingston DDR3-1333; OS Drive: Western Digital Caviar Black 1TB; Windows 7 Ultimate x64

ViewSonic VOT125-4 PC Mini

OK, so you can't game *all* the time. Nor will you always be rendering video, writing and debugging code, or doing a thousand other tough jobs that require a monster system. Sometimes small is good, especially when it'll still get the job done.

The VOT125-4 is small, but it's no slouch. No way it can go head-to-head with your main system, but as a second setup? Not bad at all.

The VOT125-4 is tiny: At 5.11 x 1.5 x 4.5 inches (HxWxD), it's almost literally palm-sized. But packed in that little case is a fair amount of power and a set of specs that is comparable to some full-sized desktop machines: The ultra-low voltage Core 2 Duo SU7300 processor runs at 1.3GHz, and the machine comes with 2GB of DDR2-800 SO-DIMM. Add a 3-in-1 card reader, four USB ports, and the typical line-in/mic-in and Wi-Fi/Ethernet setup, and you've got a powerful

little system that can justify the space it takes up on your desk or worktable.

And speaking of which . . . the VOT125-series machines include VESA mounts, so you can mount the case almost anywhere; you can even tuck it behind a VESA-compatible monitor—which means that, if you like, it can take up *no* room on your desk at all, instead hanging from the back of your monitor like some sort of Windows-based alien pod-like life form.

Powerful for its size, the VOT125-4 is a quiet, energy-efficient computing option that's worth considering as a second system. It may not have what you need when you're rendering CGI or involved in heavy-duty MMORPG, but

VOT125-4 PC Mini

\$679

ViewSonic

www.viewsonic.com



it'll fill the bill for most everyday uses. A zero-footprint PC that runs Windows 7 and has more horsepower than that netbook you've been thinking about? Definitely worth checking out. ■

BY ROD SCHER

Specs: Case: Black plastic; CPU: ULV Intel Core 2 Duo SU7300/1.3GHz; Chipset: Intel GS45; Graphics: Intel GMA 4500MHD; Memory: 2GB DDR2 SDRAM; Storage: 250GB 5,400rpm SATA HDD; Ports: 1 HDMI, 1 DVI, 4 USB 2.0, 1 10/100 Ethernet, 1 mic, 1 stereo; 3-in-1 card reader; OS: Windows 7 Home Premium; Dimensions: 5.11 x 1.5 x 4.5 inches (HxWxD)

msi™



PhysX
by NVIDIA



WORLD'S FIRST TRIPLE OVER VOLTAGE

GPU • MEMORY • PLL

N460GTX HAWK



MSI N460GTX HAWK / SPECIFICATIONS

Model Name	V238
GPU	GeForce GTX 460
Codename	GF104
CUDA Cores	336 Units
Core Clock	780 MHz
Shader Clock	1560 MHz
Memory Clock	3600 MHz
Memory Size	1024MB GDDR5
Memory Bus	256 bits
Output	Dual DVI-I + mini HDMI
TDP	180W
Form Factor	238 x 111 x 37 mm
DirectX	11
OpenGL	4.0
CUDA	Y
SLI	Y
PhysX	Y
PureVideo HD	Y
HDCP	Y

AVAILABLE AT:

amazon.com

Fry's
ELECTRONICS

mwave.com

MICRO CENTER
computers & electronics

newegg.com

NCIX.com

TigerDirect.com

for more info, visit us at **us.msi.com**

Sapphire HD6970 2GB GDDR5 BFBC2 Vietnam Game Edition AMD's New Flagship GPU Shakes Things Up

In last month's review of the Nvidia GeForce GTX 580, we advised our readers to hold off. We're generally not nostalgic types, but with the launch of AMD's Radeon HD 6970, the contentious battle for graphics supremacy really takes us back. There's nothing quite like two high-end GPUs launching in close proximity. The fanboys are frothing, prices are falling, and we can't help but get a little teary.

AMD's Cayman XT owes its 2.7 TFLOPs of raw compute performance to an 880MHz core clock, and its 5.5Gbps memory bandwidth to a 1,375MHz memory clock and 2GB of GDDR5 running on a 256-bit bus. Architecturally, the Radeon HD 6970 offers significantly enhanced geometry performance, even compared to the 6800 series GPUs. Cayman features dual graphics engines, which double the vertex and geometry assemblers and deliver faster geometry setup. Each SIMD features 64 ALUs; there are 24 SIMDs, which gives the GPU a total of 1,536 ALUs.

AMD also revamped its shader hardware by moving from VLIW5 (Very Long Instruction Word; originally introduced in the R600) to a VLIW4 design, which utilizes four identical shader units compared to VLIW5's four identical units plus one special function unit. Although the move from VLIW5 to VLIW4 sounds like a step backward, the special function unit was extremely underutilized in previous architectures, and by cramming more SPUs into the reclaimed die area, AMD is able to realize a 10% performance improvement per mm². AMD has also tweaked the render back-ends to deliver faster 16-bit integer and 32-bit floating point operations. There are 96 texture units and 32 ROPs. Other new features include AMD's eighth-generation

tessellator and support for a new AA setting called Enhanced Quality Anti-Aliasing.

The 6970 also features AMD's fifth-generation vapor chamber technology, which keeps the GPU cool and relatively quiet. As a nod to enthusiasts, AMD added a dual BIOS toggle switch, which lets you install a performance-tweaked BIOS without fear of bricking the card. If the BIOS fails, just flip the switch, reflash the BIOS, and try again. The switch won't keep you from melting your card, so practice caution when installing and running these tweaks.

We like to think of TDP as the upper limit for component power consumption, but in reality, GPUs tended to exceed that limit when running rare workloads, such as synthetic benchmarks like FurMark. With AMD's new PowerTune technology, when the predetermined power limit is reached, the GPU dynamically lowers the core clock. This is important, considering the 6970 matches the GTX 580 in load temps and noise output. AMD claims that typical gaming and idle power for the 6970 is 190W and 20W, respectively, well below its 250-watt PowerTune maximum.

At \$389, Sapphire's Radeon HD 6970 (stock settings) is only slightly more expensive than the GeForce GTX 570, but it surpasses Nvidia's offering in every benchmark but S.T.A.L.K.E.R.: Call of Pripyat. Sapphire's inclusion of Battlefield: Bad Company 2 Vietnam just sweetens the deal. Although it couldn't topple the GTX 580, for this price, AMD has a real winner in the Radeon HD 6970. ■

BY ANDREW LEIBMAN



**HD6970 2GB GDDR5
BFBC2 Vietnam
Game Edition**
\$389.99
Sapphire

www.sapphiretech.com

	Sapphire Radeon HD6970	Nvidia GeForce GTX 580
Specs & Scores		
Price	\$389.99	\$499
Idle Temp	41.6 C	39.1 C
Load Temp	85.2 C	87 C
Max Noise Output	68.5 dBA	65.2 dBA
3DMark 11 Performance		
Overall	P5275	P6002
Graphics Score	4890	5716
Physics Score	9148	8329
Combined Score	5050	5754
Graphics Test 1 (fps)	21.34	24.95
Graphics Test 2 (fps)	25.88	26.29
Graphics Test 3 (fps)	31.77	36.84
Graphics Test 4 (fps)	14.06	17.96
Physics Test (fps)	29.04	26.44
Combined Test (fps)	23.49	26.77
Games		
1,920 x 1,200		
Left 4 Dead 2 (8XAA, 16XAF)	119.62	133.29
S.T.A.L.K.E.R.:	35.2	43.22
Call of Pripyat (4XAA)		
Aliens vs. Predator (4XAA)	40	43.2
2,560 x 1,600		
Left 4 Dead 2 (8XAA, 16XAF)	83.82	88.02
S.T.A.L.K.E.R.: CoP (4XAA)	22.63	27.3
Aliens vs. Predator (4XAA)	25	27.2
Driver: Catalyst 10.11/ForceWare 263.09		
Specs: GPU: Cayman XT; Core clock: 880MHz;		
Memory: 2GB GDDR5 (1,375MHz); 1,536 Stream		
Processors; 96 texture units; 32 ROPs		
Test system specs: CPU: 3.33GHz Intel Core i7-980X		
EE; Motherboard: Gigabyte GA-X58-USB3; RAM: 6GB		
Patriot Sector 7 DDR3; Storage: 128GB Patriot Zephyr		
SSD; PSU: Antec TruePower Quattro 1,200W		

AMD Phenom II X6 1100T Black Edition

The latest top chip in AMD's six-core line is the Phenom II X6 1100T Black Edition, supplanting the Phenom II X6 1090T as the king of the hill.

Clocked at 3.3GHz, the 1100T also sports a slight specification bump up from the 1090T (3.2GHz), giving consumers their choice of Phenom II X6 speeds including 3.3GHz, 3.2GHz, 3.0GHz (1075T), 2.9GHz (1065T), and 2.8GHz (1055T).

On its own, the 1100T is a decent chip. It performed as expected, and we managed to reach 3.9GHz when overclocking. However, the introduction of the 1100T to the Phenom II X6 family also triggers price reductions for both the 1090T (from \$295 to \$235) and the 1075T (from \$245 to \$199), and frankly, that's where the value of the 1100T lies.

(New pricing for the 1055T was not announced at the time of this writing.)

The 1100T is debuting at a price that is \$30 lower than the previous top-of-the-line AMD hexa-core and is pushing down the cost of the rest of the line of CPUs accordingly. Thus, although you won't go wrong if you buy the 1100T, you can nab an even better bargain with the 1090T or 1075T, which offer slightly less performance but for a lot less money. ■



BY SETH COLANER

Phenom II X6 1100T
\$265
AMD
www.amd.com

Specs: Socket AM3; Clock speed: 3.3GHz (3.7GHz Turbo); HyperTransport 3.0 link: 4GHz full duplex; 45nm process; Cache: 3MB total L2, 6MB shared L3; 125W max TDP

Test system specs: Motherboard: ASRock 890GX Extreme4; RAM: 2GB OCZ DDR3-1333; Graphics: ATI Radeon HD 5850; Storage: 128GB Kingston SNVP 325 SSD

Zotac GeForce GTX 460 AMP!

In our estimation, the GeForce GTX 460 is the highlight of the 400 series, and even though the GeForce GTX 560 is coming soon, Zotac just managed to squeeze even more performance from the GF104. Zotac pushed the stock 675MHz core and 900MHz memory clocks to 810MHz and 1,000MHz, respectively—the highest GF104 clocks we've seen to date.

Zotac also outfitted its OCed GTX 460 with a dual-slot custom cooler, dropped the mini HDMI port in favor of full-sized HDMI, and added a DisplayPort. Two 6-pin PCI-E connectors supply power to the card, which features a single SLI connector. In the box, Zotac includes a pair of PCI-E power adapters, a VGA-to-DVI adapter, and a copy of Prince of Persia: The Forgotten Sands. The Zotac GTX 460 AMP! will barely break a sweat running this game, but it's a nice bonus nonetheless.

In the benchmarks, Zotac's card shows its out-of-the-box superiority to other factory

OCed 460s, as well as to Sapphire's overclocked Radeon HD 6850. It has a slight edge in 3DMark 11 but shows a much healthier lead in DX11 titles, including S.T.A.L.K.E.R.: Call of Pripyat and Aliens vs. Predator. The GTX 460 AMP! has been pushed to the limit and it's still less expensive than some other, slower, 460s. ■

BY ANDREW LEIBMAN



GeForce GTX 460 AMP!
\$239.99
Zotac
www.zotacusa.com

Benchmark Numbers

AMD Phenom II X6 1100T	
PCMark Vantage Pro	
Overall	11562
Memories	6984
TV And Movies	4707
Gaming	13143
Music	15683
Communications	9223
Productivity	15046
HDD	17973

POV-Ray 3.7* 4725.61pps

Cinebench 11.5

CPU** 5.9

SiSoft Sandra Lite 2010c

Processor Arithmetic

Dhrystone ALU (GIPS)	70
Whetstone iSSE3 (GFLOPS)	57

Processor Multi-Media

Integer x16 aSSE2 (Mpixels/s)	230
Float x8 iSSE2 (Mpixels/s)	141.1
Double x4 iSSE2 (Mpixels/s)	77.19

* pixels per second

**points

Specs & Scores

Zotac GeForce GTX 460 AMP!

3DMark 11 Performance

Overall	P3777
Graphics Score	3461
Physics Score	8335
Combined Score	3330
Graphics Test 1 (fps)	16.14
Graphics Test 2 (fps)	16.73
Graphics Test 3 (fps)	21.76
Graphics Test 4 (fps)	10.2
Physics Test (fps)	26.46
Combined Test (fps)	15.49

Games 1,920 x 1,200

Left 4 Dead 2 (8XAA, 16XAF)	88.2
S.T.A.L.K.E.R.: CoP (4XAA)	27.5
Aliens vs. Predator (4XAA)	27

2,560 x 1,600

Left 4 Dead 2 (8XAA, 16XAF)	55.86
S.T.A.L.K.E.R.: CoP (4XAA)	15.27
Aliens vs. Predator (4XAA)	16.2

Drivers: ForceWare 260.99

Specs: GPU: GF104; Core clock: 810MHz; Memory: 1GB GDDR5 (1,000MHz); 336 CUDA cores; 56 texture units; 32 ROPs

Test system specs: CPU: 3.33GHz Intel Core i7-980X EE; Motherboard: Gigabyte GA-X58-USB3; RAM: 6GB Patriot Sector 7 DDR3; Storage: 128GB Patriot Zephyr SSD; PSU: Antec TruePower Quattro 1,200W

Thermaltake Challenger Pro

Your senses have to be totally dedicated to the game when you're trying to demolish a battalion of zombies at a LAN party. Peripherals need to match the intensity of a seasoned gamer, so it's a good thing that the Thermaltake Challenger Pro rises to meet our expectations.

Thermaltake went to great pains to provide everything to game well, and then some. Along with a black and red keyboard, we unpacked a nylon braided USB cable, red arrow and WASD replacement keys, a keycap puller, a dummy keycap that replaces the Windows key, and two storage bags.

There are two holes purposed for the tiny detachable cooling fan, which keeps your left hand pleasantly chilled when typing. If you decide to forgo the fan, just clip it in the built-in storage compartment. The Challenger Pro doesn't use mechanical keyswitches, but I was nonetheless impressed with the rubber

Thermaltake Challenger Pro

\$79.99

Thermaltake

usa.ttesports.com



Specs: Interface: USB; 10 macro keys; 6 multimedia keys; 2 USB ports; Switch life cycle: 10 million; Detachable cooling fan; Removable keycaps; Red backlight; Dimensions: 1.06 x 19.88 x 7.68 inches (HxWxD)

dome keyswitches, which use higher-density silicon for a little more tactile feedback.

While installing the eight red keys, we bent the black Up arrow key in half using the keycap puller. Although this tool isn't useless by any means, you have to be delicate and precise when you pry out the keys. That blunder aside, the red keycaps are easy to snap into place.

The peripheral keys magnify the Challenger Pro's awesomeness. There's

a row of multimedia keys, 10 T-buttons for recording and executing macros, an illumination key to adjust backlighting brightness, and a gaming profile switch key.

When you consider the smart keyboard layout, replacement keys, and macro capabilities, the total Challenger Pro package might just raise the bar on gaming keyboard design. ■

BY JOANNA CLAY

Wacom Intuos4 Medium

A good graphics tablet is the input device of choice for creating art on a computer, and Wacom's tablets—and the software that powers them—are among the most powerful available.

The Intuos4 Medium tablet (it's available in three sizes), with a resolution of 5,080 lines per inch, is aimed at professional and serious amateur graphic artists. It offers 48.5 square inches of working area and features an ambidextrous design; eight programmable keys; and a cordless, battery-less mouse and pen with multiple replacement nibs.

The pen, with 2,048 pressure levels (making it about twice as sensitive as Wacom's previous model), has a two-position rocker switch that by default triggers single and double mouse clicks, but which can be programmed to mimic just about any key or key combination. You can use the pen's 10 replaceable nibs



for different drawing or lettering styles or as replacements for worn nibs.

The unit's programmable ExpressKeys are located along one side of the tablet in two vertical blocks of four each, with a programmable Touch Ring located between the blocks. The latter is excellent for controlling incremental functions such as zoom or scrolling.

The Intuos4 is a solid piece of technology—and the sculpted, matte and gloss black slab is beautiful to look at—but much of its utility actually derives from the Wacom Tablet Properties software that accompanies the tablet. This

Wacom Intuos4 Medium Graphics Tablet

\$349 | Wacom | www.wacom.com

Specs: Case: Black plastic; Dimensions: 0.5 x 14.6 x 10.0 inches (HxWxD); Weight: 2.2 lbs.; Work Area: 8.8 x 5.5 inches; Pressure Levels: 2,048; Resolution: 5,080 lpi; Input: Touch Ring, eight programmable keys, battery-free/cordless pen and mouse; Connectivity: USB; System Requirements: Windows 7, Vista, XP, Mac OS X 10.4.8+

software lets you set global functions or define how the pen and tablet should behave for different applications: For example, a pen-click in Photoshop may initiate an Undo, while in a CAD app, the same click pans or scrolls.

The Intuos4 is a professional-class graphic design tool that's easy to use and easy to look at. It will do nothing but enhance even further Wacom's already excellent reputation. ■

BY ROD SCHER



SUIT UP

UPGRADE TO COOLER MASTER POWER SUPPLY.

On the gaming battlefield or when overclocking, no one wants to be left behind.
Prepare by arming yourself with the right power supply for the job.



www.coolermaster-usa.com

amazon.com

buy.com



the all-new
COMPUSA.com

Fry's

JAR

MICRO CENTER
The Computer Company Store



TigerDirect.com

Zalman N-Series 128GB SSD

Today's fastest desktop SSDs center on the SandForce SF-1200 controller. That's both a good and a bad thing for the companies selling these drives. It's good because there's plenty of demand for fast storage, and it pays to sell flagship hardware. But that also makes it hard for manufacturers to differentiate. The competition for enthusiast affection is consequently cutthroat.

Zalman's SSD0128N1 is the newest SandForce SF-1200-based SSD to hit the market. Our review sample is a 128GB model (111.8GB formatted), but Zalman also ships 64GB units to help make solid-state technology more affordable. Performance should be similar—that is to say, impressive—between both SKUs. We compared Zalman's entry to the Vertex 2 and Agility 2 from OCZ, both of which also employ SandForce controllers, plus Intel's revered X25-M, which uses Intel's own proprietary controller. Sequential read performance exceeded 200MBps for all drives, though the X25-M put down throughput closer to 270MBps. The three SandForce drives turn the tables on Intel in sequential writes.

The dominance continues in random write testing, where all three SandForce SSDs outmaneuver the X25-M with a queue depth of one. Setting the queue depth to 32 catapults Zalman's N-series and OCZ's Vertex 2 into a commanding lead. Queue depth represents the number of outstanding I/O operations; most SSDs realize their best performance in very I/O-intensive environments. This is definitely the case for Zalman's offering.

Although there's not much setting the SSD0128N1 apart from other SF-1200-based SSDs, it establishes itself as one of the fastest consumer SSDs. Zalman's N-series drives are a solid first effort, and we look forward to seeing what Zalman does with SandForce's upcoming next-gen controller. ■

BY PAUL CROSS



**N-Series
128GB SSD**

\$249

Zalman

www.zalman.com

Benchmark Results	Zalman N-Series 128GB	OCZ Vertex 2 120GB	OCZ Agility 2 120GB	Intel X25-M 160GB
CrystalDiskMark 3.0*				
Sequential read	213.87	214.68	214.06	268.07
Sequential write	143.76	142.67	145.45	106.94
Random read (4KB, QD1)	26.18	26.36	26.03	23.47
Random write (4KB, QD1)	82.98	83.92	81.42	59.41
Random read (4KB, QD32)	112.92	117.78	118.59	165.76
Random write (4KB, QD32)	132.64	131.16	53.98	59.65
*Results in MBps				
Specs: Capacity: 128GB (111.8GB formatted); Maximum read/write (advertised): 280MBps/270MBps; MTBF: 1 million hours; TRIM support				
Test system specs: CPU: Intel Core i7-980X @ 3.73GHz; RAM: 6GB Kingston DDR3-1333; GPU: GeForce GTX 460 1GB; Motherboard: Gigabyte X58A-UD5				

Zalman Z9 Plus

Zalman Z9 series are midtower cases that are available in two versions: the Z9 and Z9 Plus. Zalman sent us a Z9 Plus for testing, and the biggest difference between the Plus and base model is that the Z9 Plus' front panel features a two-channel fan controller and temperature sensor display.

Much of the Z9's exterior consists of mesh covering to provide airflow to the interior. Even the side-panel window is made primarily of hexagonal mesh openings in between two small, clear plastic windows. The mesh exterior is complemented with support for up to seven system fans. Four 120mm fans come preinstalled, with one on the front, side, rear, and top panels. Both the exterior and the interior of the Z9 are all black, and

Zalman smartly includes black screws and connectors for a cohesive-looking design.

One construction aspect we really enjoyed was the antivibration rubber mounts that allow the HDDs to slide into the tool-free bays. The antivibration rubber mounts are perfectly sized so that they easily slide into place, and a plastic lever in the bay secures the HDD. There are five HDD bays and two places inside the case where you can install an SSD. (One is a 2.5-inch adapter above the hard drive cage, and there's also a 2.5-inch bracket on the back of the motherboard tray.) The interior is large enough to fit graphics cards up to 290mm in length, which means that it can more than handle Nvidia's GTX 580 and AMD's Radeon 6970.

The Z9 Plus may be a little short on flash, but it has a lot of enthusiast features for an affordable price. And its light weight

(15.9 pounds without any parts) design would be ideal for LAN partygoers. ■

BY NATHAN LAKE



Z9 Plus

\$74.99

Zalman

www.zalman.com

Specs: Dimensions: 18.3 x 8.1 x 19.8 inches (HxWxD); Motherboard compatibility: ATX, microATX; Bays: 5 3.5-inch internal, two 2.5-inch internal, 3 5.25-inch external; Expansion slots: 7; Standard fans: 1 120mm front, 1 120mm rear, 1 120mm side, 1 120mm top

NorthwestWare Elite

H TPC owners generally fall into two categories: those who want to hide or disguise their TV computing contraptions and those seeking a conversation piece—a totem of geekiness and a finger in the eye of Roku, TiVo, Google TV, and every other TV-to-Internet connectivity pretender out there. NorthwestWare's Elite takes the latter, less-traversed trail and puts the Intel Atom and Nvidia Ion combo into a case fashioned from

your choice of exotic and handsome hardwoods. The finely crafted case is shaped like a truncated pyramid, accented with complementary shades of timber and veneered to a high sheen.

We've reviewed the Ion platform in *CPU* before, and the Asus AT3IONT-I Deluxe with integrated dual-core Intel Atom 330 (1.6GHz) and Nvidia's GeForce 9400, er, Ion, holds few surprises.

For our test unit, NorthwestWare added 2GB of Corsair DDR3 (underclocked to 1,066MHz), a 160GB HDD, built-in 802.11b/g/n

Wi-Fi, and a Bluetooth module. From a strict specs standpoint, the Elite's appeal is limited. It lacks any internal expandability options. NorthwestWare can, however, accommodate custom requests, offers a USB TV tuner, and plans to offer SSDs soon.

But the Elite's guts aren't the main attraction. NorthwestWare's case (ours had a Leopardwood frame and Birdseye Maple top insert) is well designed, surprisingly easy to open, and, most of all, stunning to behold. Although the asking price feels steep, more common woods, such as oak, maple, and cherry can be had for the base price of \$799.98; the more exotic specimens can quickly add over \$300 to the price.

But it's hard to put a price on art, and this art just happens to have a PC inside. ■

BY ANDREW LEIBMAN



Elite

\$944.98 (as configured)

NorthwestWare

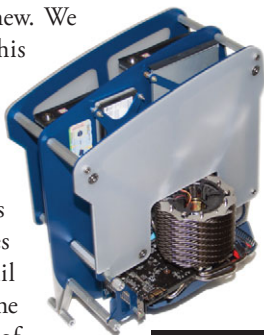
www.northwestware.com

Specs: Motherboard: Asus AT3IONT-I Deluxe; CPU: Intel Atom 330; GPU: Nvidia Ion; Memory: 2GB Corsair DDR3-1066; 160GB HDD; 802.11b/g/n; Bluetooth

DARWINmachine Hammerhead HMR989

DARWINmachine's computers are both designed and built by Matthew Kim, who has been trained as an architect and worked with racecar design and engineering. "I wanted to design something that would change the way that people think about computers—a technological jewel, rather than an ordinary box, destined for a life of dusty obscurity," says Matthew. We got a chance to check out his Hammerhead HMR989.

Matthew tells us that the Hammerhead is designed so that you can view it from all angles. The open design allows you to bundle all your cables so they make one neat trail coming out of the computer. The Hammerhead itself is a mix of anodized aluminum and a sustainable "eco-resin" plastic. Even neater, the computer's parts are individually accessible.



Hammerhead's hardware is a mix of midrange parts, and its benchmark scores reflect the hardware.

We're certain the Hammerhead will draw some attention at a LAN party, and Matthew tells us that DARWINmachine systems each come with a unique serial number, and each series is limited to a few runs. Next year's systems will feature a new, original design, so you'll have a truly limited-edition PC. ■

BY NATHAN LAKE

Hammerhead HMR989

\$2,899 (as tested)

DARWINmachine

darwinmachine.com

Specs: CPU: Intel Core i7-860 @ 2.8GHz; GPU: Asus ENGTX460; RAM: 4GB OCZ Gold DDR3-1600; Motherboard: Gigabyte P55M-UD2; Storage: 40GB Intel SSD, 640GB Western Digital Caviar Green; OS: Windows 7 Home Premium (64-bit)

Benchmark Results | DARWINmachine Hammerhead HMR989

3DMark Vantage	
Overall	X7826
GPU Score	7599
GPU1 (fps)	23.78
GPU2 (fps)	20.68
PCMark Vantage Pro 1.0	
Overall	11569
Memories	7504
TV And Movies	5031
Gaming	14365
Music	12390
Communications	8031
Productivity	15827
HDD	16030
Left 4 Dead 2	60
FarCry 2 (8XAA)	40.18
Aliens vs. Predator	23.2
Games tested at 2,560 x 1,600.	

Corsair HS1 USB Gaming Headset

Corsair is well respected among enthusiasts and has earned a reputation for offering quality products and reasonable prices. It seems the company stuck to that approach when designing the HS1 headset. On the surface, the HS1 looks rather unassuming. But put the HS1 headset on and listen to some music, and it becomes obvious comfort and sound quality were high on Corsair's list of priorities.

Set up the HS1 by plugging the headset into an available USB port and installing a tiny configuration app. With the app installed, the HS1 offers users control over various settings such as DSP mode, which affects the Dolby

Headphone configuration, virtual speaker setup, mixer, and more.

Throughout testing, I found the sound quality of the HS1's 50mm drivers to be superb, regardless of the audio source. Music was crisp and clean, and minute details in movies, music, and games were clearly audible. The HS1 seemed to favor highs and mids, but bass response was very good, too. Positional audio effects were also decent, although I've never been terribly impressed with simulated positional effects in any 2-channel headphones.

The HS1 headset was also extremely comfortable to wear—even for extended periods—thanks to its large, cloth-covered

memory foam pads and circumaural cups that were big enough to completely cover my ears.

Corsair hit a home run with the HS1 USB Gaming Headset. In addition to offering excellent sound quality, it's comfortable, easy to use, and, at \$99, affordable. If you're looking for a good headset and don't mind the subdued look of the HS1, it's worth every penny. ■

BY MARCO CHIAPPETTA



HS1 USB Gaming Headset
\$99.99
Corsair
www.corsair.com

Specs: (Microphone): Type: Unidirectional noise-canceling condenser; Impedance: 2.2k ohms; Frequency response: 200Hz to 10kHz +/- 2dB; Sensitivity (1mW, 1kHz): -45dB +/- 2 dB

Specs: (Headphones): Frequency response: 20Hz to 20kHz; Impedance: 32 ohms at 1kHz; Dynamic range: 93dB; Drivers: 50mm

PowerColor PCS+ HD6870 1GB GDDR5

Shortly after the AMD Radeon HD 6870 hit the scene, PowerColor was at the ready with an overclocked variant. With the PCS+ HD6870 1GB GDDR5, PowerColor has taken the Radeon HD 6870 reference design and tossed the stock cooler in favor of a custom unit—a dense array of aluminum fins linked to a heavy copper heat plate by a trio of thick copper heatpipes.

The PCS+ HD6870's increased clocks give it a small performance edge over a stock

6870. What's better is the cooler's performance. The PCS+ cooler keeps GPU temps lower than a stock card (39/81 [idle/load] degrees Celsius vs. 42/84 C), and it was quieter, too.

The PCS+ HD6870 is one of the more attractive 6870s on the market, thanks to its factory overclock and quiet cooler. The PCS+ HD6870 is still a relative value, but compared to the reference 6870, for a 10 to 15% higher asking price, users will only get about 3 to 5% more performance. ■

BY MARCO CHIAPPETTA



PCS+ HD6870 1GB GDDR5
\$274.99 | PowerColor
www.powercolor.com

Specs: GPU: Radeon HD 6870; Core clock: 940MHz; Memory: 1GB GDDR5 (1,100MHz); 1,120 stream processors; 56 texture units; 32 color ROPs; Two-year warranty

Benchmark Results	PowerColor PCS+ AX6870	Stock Radeon HD 6870
Unigine Heaven v2.1 (Extreme Tessellation)*		
Score	477	471
FPS	18.9	18.7
3DMark Vantage (Extreme Preset)		
Overall Score	7994	7678
GPU Score	7745	7431
GPU Test 1 (fps)	24.81	24.69
GPU Test 2 (fps)	18.86	18.75
Aliens vs. Predator*		
1,920 x 1,200	274	271
2,560 x 1,600	16.5	16.3
Just Cause 2*		
1,920 x 1,200	3732	3518
2,560 x 1,600	27.16	24.19

* Unigine Heaven, Aliens vs. Predator, and Just Cause 2 tested with 4X anti-aliasing and 16X anisotropic filtering.
Test system specs: CPU: Intel Core i7-965; Motherboard: Gigabyte EX58-UD5; RAM: 6GB OCZ DDR-1333; Storage: WD Raptor 150GB; Windows 7 Ultimate x64; Catalyst 10.10e Drivers

ZALMAN
COOL INNOVATIONS

TRIMON

3D
DISPLAY

FULL
HD



Experience True 3D in Full High Definition



Experience the passive 3D polarization technology at home with a simple 2D/3D conversion. Zalman's passive 3D has no motion sickness side effect. Unlike active shutter glasses, the passive glasses are inexpensive, light weight and require no battery charging. Share the 3D experience with friends and family. Now available in 21.5 and 24 inches.



Stereoscopic Player Optional

www.zalman.com

sales request: sales@zalmanusa.com

Modded Mobility

Overhaul A Notebook For Insane Performance

One of the few drawbacks to being a hardcore power user is that constant urge to upgrade our systems. That's all well and good with our desktops, because we can swap parts in and out on a whim (budget permitting, of course).

But our notebooks and netbooks can pose a bit of a problem. More often than not, there are only a few components in a notebook that can be easily upgraded. Sometimes it's just easier to simply replace the notebook altogether. Replacing an entire notebook usually requires a significant investment, naturally, especially if you want a machine that offers cutting-edge technology, as we power users tend to do. A cookie-cutter, low-budget, mainstream machine isn't going to cut it for most of us.

So, what's a power user itching for a faster notebook to do? Upgrade, that's what. And, as it turns out, the two components that usually can be upgraded in a notebook without a great deal of difficulty, the hard drive and RAM, also have a huge impact on overall system performance. Having more available memory in a system will result in less drive thrashing and better multitasking performance, and swapping out a hard drive in favor of a solid-state drive remains one of the best upgrades anyone could make to a system. A side benefit to replacing the main drive in a notebook is that it usually forces a fresh OS install, with new drivers, firmware, BIOS, etc., which may also improve performance.

With all of this in mind, we decided to put our tools and expertise to work on a notebook to see if it was worth the time and money to upgrade. Our goal was to expand the memory of a notebook and install an SSD and Windows 7, all while trying to be as economical as possible.

The Arsenal

The solid-state storage and memory markets are in a constant state of flux, with



Didn't get that new notebook you wanted for Christmas? Don't fret. With a few upgrades, you'll be amazed at the additional performance you can squeeze from an older machine.

prices changing almost daily. At this point in time, though, SSD prices have slipped considerably, and memory prices are on the low side, as well. So, we set out to find a relatively affordable, yet high-performing SSD, ultimately settling on one of OCZ's 120GB Agility 2 drives, which is powered by a SandForce SF-1200 series controller. At the time of this writing, the 120GB Agility 2 was available for \$229.99 from Newegg. The 120GB capacity offers enough storage space for our needs, and at under \$1.92 per GB, the Agility 2 represents a great value. (We should also note that a 90GB model was available for \$189.99, for those who could get by with less storage space.) The OCZ Agility 2 is also an excellent performer, as is the case with many of the SandForce-based drives currently on the market.

For our memory needs, we ultimately turned to Mushkin. At the time of this writing, a 4GB (2 x 2GB) DDR3-1066 SO-DIMM kit could be had for just under \$60. Our test platform, Asus' Eee PC 1215N, required DDR3 memory; keep in mind that older notebooks may require DDR2.

The total hardware investment for our mods was \$290—not a pittance by any means, but much more palatable than the \$600 to \$900 a decent new notebook would cost. Because we're also going to install Win7 on our test platform, we'd be remiss not to mention the cost of the OS, but here you have some flexibility. Clearly, the best-case scenario is already owning a copy you can use for a fresh install. Otherwise, there are numerous, legitimate ways to affordably obtain copies of Win7, including academic discounts, joining TechNet, attending a Microsoft Seminar, or even just following MS on Twitter and taking advantage of the many promotions Redmond runs. With that said, figure another \$99 into the equation should you just want to buy a retail copy with as little hassle as possible.

Make The Modifications

Before beginning the actual upgrade process, we'd recommend taking a few additional steps to help ensure a smooth ride. First, download the latest drivers for all of your notebook's components. Tracking

down which LAN or audio controllers are used in a notebook, for example, can be a real pain if the Device Manager doesn't report their names properly after a fresh OS install. Second, grab the latest BIOS for the notebook from the manufacturer's Web site and install it to minimize the chance of compatibility issues with certain drives or memory. Finally, grab yourself the right tools for the job and some sort of container that will make it easy to keep track of all of the screws that you may need to remove. Trust us on this last tip. You'll be happy to have everything organized if your notebook

requires a complete teardown to swap out its drive, as ours did.

Swapping the memory in our machine was very simple. After disconnecting the wall adapter and removing the battery, all we had to do was remove a single screw and pop off a panel to gain access to the stock memory. We disengaged the clips holding the stock SO-DIMMs in place and simply slipped the new memory in its place. The memory upgrade bumped up our test machine from 2GB to 4GB, doubling its total memory capacity. The speed of the memory remained the same, however, so



How much faster would a notebook be with a solid-state drive, double the memory, and Windows 7? We wanted to find out.

Performance: Before & After the Mods

To quantify the effect installing more memory, a solid-state drive, and Windows 7 had on overall system performance, we ran an assortment of popular benchmarks on our netbook. The tests consisted of a system-level benchmark (PCMark Vantage), an encoding test (LAME MT), and a trio of tests that mostly stress individual components—the CPU (Cinebench R11.5), GPU (3DMark Vantage), and the HD/SSD (HDTach). As you'll see in our results, the boost to overall system performance, especially the storage subsystem, are dramatic to say the least.

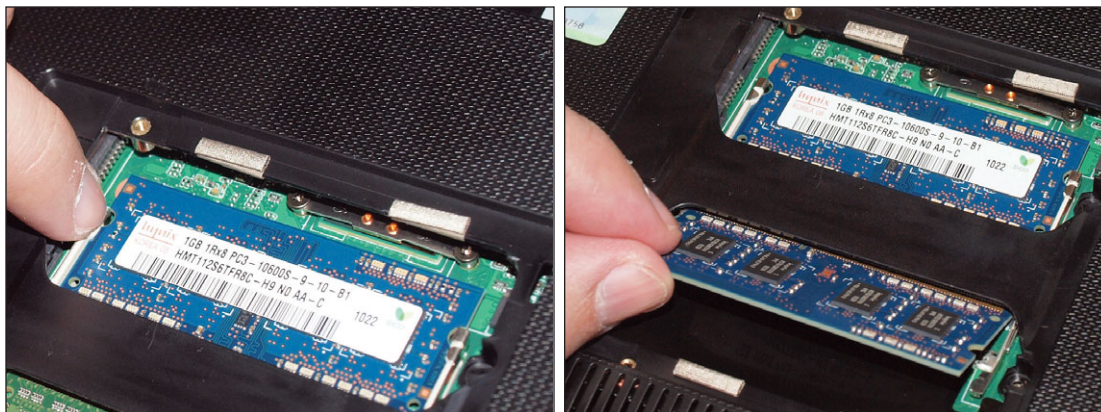
Upgrading to an SSD, increasing the RAM, and installing Win7 increased the overall PCMark score of our Asus Eee PC 1215N by almost 74%. The largest gains in the individual PCMark Vantage modules came in the Music test, which showed an impressive 84.96% improvement, and the Productivity test, which increased by a whopping 207%. Of course, the HDD test showed huge gains, as well—898.76% to be exact—thanks to the new SSD.

If we shift focus to the component-level tests, the GPU-centric 3DMark Vantage doesn't show much improvement. We didn't expect much, to be honest, but using Win7 and the latest graphics drivers for the system did result in some minor gains. Cinebench R11.5 similarly showed a slight gain in its OpenGL GPU test, but the results remained flat in the CPU test. LAME MT, however, which is almost completely CPU-bound but does constantly write a file during the test, actually showed a small decrease in performance. The slight decrease in performance in the LAME MT test is likely the result of the SSD's higher CPU utilization.

Finally, HDTach clearly shows why upgrading to an SSD will result in a massive performance boost (provided the system isn't completely held back by some other component that's causing a more severe bottleneck). In the HDTach tests, the SSD was between 6.21% and 2,720% faster than the stock hard drive. Read speeds increased by almost 350%, while CPU utilization climbed 5%. It's that monstrous improvement in access time, though, along with the faster transfers, that really makes a system feel snappy when an SSD is installed. ■

	Asus Eee PC 1215N (stock)	Asus Eee PC 1215N (upgraded)
OS	Windows Vista Ultimate 32-Bit	Windows 7 Ultimate 64-bit
Memory	2GB	4GB
Storage	250GB, 5400rpm HD	120GB SSD
PCMark Vantage		
Overall Score	1871	3244
Memories	522	669
TV and Movies	1640	1873
Gaming	1827	1951
Music	2340	4328
Communications	1516	2096
Productivity	1828	5612
HDD	3142	31381
Cinebench R11.5		
CPU	0.59	0.59
OpenGL	5.81	5.93
LAME MT (min:sec)*		
Single-Threaded	3:39	3:41
Multi-Threaded	2:32	2:34
3DMark Vantage Entry		
Overall Score	3091	3183
GPU Score	4053	4107
HDTach		
Read Bandwidth	44.1MBps	197.6MBps
Burst Rate	218.9MBps	232.5MBps
Random Access Time*	27.2ms	0.1ms
CPU Utilization*	0%	5%

* Lower scores equal better performance.



Upgrading a notebook's or netbook's memory is typically very easy. Remove a screw or two from a panel on the underside of the machine, and the SO-DIMMs will be right there. Simply disengage the tabs on either side of the memory, and it'll pop right out.

there would be no bandwidth gains to speak of. If your notebook, however, has the necessary BIOS options to increase the memory frequency, it would likely be worth investing in some higher-clocked modules for the additional bandwidth.

Replacing the drive in our test notebook proved to be much more difficult. On many notebooks, there is an easily accessible tray that holds the stock drive in place, which can be slid out after removing a screw or two. If your notebook has an easy-access drive tray, simply slide it out, unmount the stock drive, and replace it with the SSD.

If you're lucky, replacing your notebook's or netbook's hard drive with an SSD will be as simple as removing a screw and sliding out the tray that holds the drive in place. If you're unlucky—like we were—be prepared to remove a lot more screws.

If, however, your machine requires more disassembly, search online for teardown instructions and proceed with caution.

We chose the Eee PC 1215N for this project because it was worst-case scenario for drive replacement. First, it had a well-used copy of Vista installed on it from a previous project, so it was in desperate need of a fresh OS installation. To swap out the 1215N's drive, we had to start by removing five screws from the machine's underside and unsnapping the touchpad from the base. We then removed four more screws to be able to move the keyboard, another seven

screws from an internal EMI shield, and, finally, four screws necessary to unplug the stock drive. We then installed the stock drive rails on our SSD, snapped it into place, and reassembled the machine.

With all of the new hardware in place, we installed Win7 without issue (and won't bore you with those details).

Additional Benefits & Trade-Offs

As you'll see in the benchmarks, upgrading our notebook with more RAM, an SSD, and Win7 had an enormous—like night and day, actually—impact on



performance. What the benchmarks don't show is that the machine boots lightning quick, applications load in a blink, and the responsiveness of the OS in general is something that has to be experienced to be appreciated. To put it simply, the upgrades were absolutely worth it.

There were, however, some other additional side benefits and trade-offs to mention, as well. For one, we cut our storage

capacity in half. Our test notebook came with a 250GB, 5,400rpm hard drive, and we now have "only" 120GB in the machine. We were only using around 50GB with a dirty Vista install, though, so we're not sweating this one. We also voided any warranty the machine may have had by pulling it apart, but that may not be a concern if your notebook's warranty has already expired.

Other pleasant surprises with this upgrade worth mentioning were increased durability (SSDs aren't affected by minor bumps, jolts, and vibrations like an HDD) and better battery life. Whereas this machine would normally last a good six hours during moderate to heavy use, our newly modded 1215N lasted about seven hours. The additional battery life is due to a combination of things, such as the faster SSD, which effectively transfers data faster than the HDD could, the additional memory, which reduces drive activity, and the benefits of a more streamlined OS in Win7.

Very Real Performance

We're sure some may scoff at the few hundred dollars necessary to pull off these upgrades, but the performance boost is absolutely worth it. For about one-third of what it would cost to buy a decent, cutting-edge notebook, we breathed new life and a ton of additional power into an existing machine. Plus, you can always move the SSD into another system, should the urge to upgrade come again. If you don't have the funds to score a totally new machine but are itching for a faster notebook, these are a couple of mods worth considering. ■

BY MARCO CHIAPPETTA

HURRICAN

2000

AZZA

ONE VISION, ONE MISSION



2x Fan Control Switches Control Fan Speed of 2x 230 mm Fans

2x 230 mm Side Fans Cool CPU and GPU Respectively

Supports up to 340 mm VGA Card, Can Easily Fit ATI 5970, Nvidia 480

Easy Swap HDD Bridge Supports 4x Easy Swap HDD

Bottom Dust Filter Prevents Dust Build-up

Top Ventilation with 2x 230 mm Fans

Supports Water Cooling Radiator up to Size 360 mm

2 x 120 mm Front Fans Provide Cooling for HDD

6x Easy Swap Bracket with Screwless Design

SSD & 2.5" HDD Bracket Supports 2x SSD or 2x 2.5" HDD

Dimension (HxWxD): 22.3"x10"x22.8" (566mmx254mmx579mm)

USB 3.0

Available at:



NCIX.com

amazon.com

MICRO CENTER
computers & electronics

shop smart, shop mwave
mwave



CYBERPOWER

DIRECTRON.COM



WWW.AZZATEK.COM



Rog-R

If you look at this month's mod, Rog-R (pronounced "roger"), and it strikes you as familiar, it's not déjà vu. We have displayed another of Stephen Popa Jr.'s mods in *CPU*, on page 38 of our September 2010 issue. And yes, that one had wheels, too—but no tracks. It was the Scooter 'Puter, and although this month's mod isn't designed for human passengers, Popa is likely to have an entire fleet of drivable PCs if he keeps going at this rate. (Popa is also the proud builder of the Zencomputer on page 48 of the September issue.)

Popa says "Rog-R" stands for Remote Operated Gaming Rig, which of course points to the fact that you don't have to haul this rig into the LAN; if you have possession of its remote control unit, Rog-R will come to you. As you have no doubt discerned, Rog-R began its life as one of Thermaltake's distinctive Level 10 cases. Popa drew on two sources of inspiration for the mod: the robot star of "Short Circuit," Johnny 5, and the robotic bomb disposal units that help our military and police bomb units do their jobs a little more safely.

Including planning, mock-up, and building time, Popa says he spent about 170 hours putting Rog-R together. In addition to building the gearbox and track assembly Rog-R motors around on (Popa credits the guys at R/C Tank Combat [rctankcombat.com] for their assistance), he had to mod the upper portion of the Level 10's 5.25-inch drive bay to house the electronics and batteries needed to operate the system's new robotic arm, which is fully operational and has five motorized joints. ("I built it to hold my headset or drink

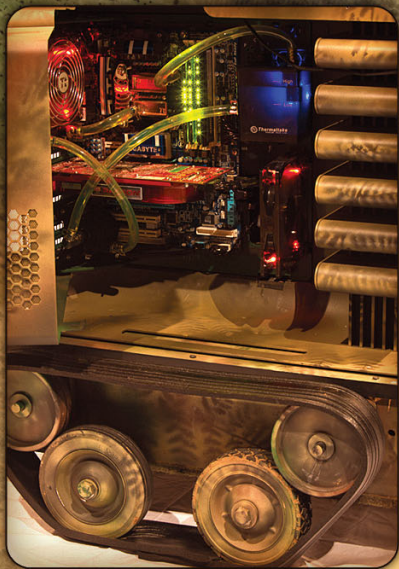
when I'm not gaming," says Popa.) He had to mount the Intel camera that sends a video feed to a 5-inch LCD that he can use along with the remote control unit to keep the PC in line when it's out of his line of sight, and he even bolted on a flashlight and an Airsoft P90, capable of firing 200 rounds per minute. For, you know, home defense.

And all of that is before you even start to think about the time Popa spent giving Rog-R its immaculate camo paint job.

Under the hood(s), Rog-R boasts an Intel Core i7-860 overclocked to 4.03GHz, Gigabyte's P55-UD4P mainboard, 4GB of Crucial Ballistix Tracer memory, an ATI Radeon HD 4870 graphics card, Thermaltake's ProWater 850i cooling system, a 160GB Intel SSD, a 2TB Western Digital HDD, and four 80GB Seagate Barracudas, all powered by Thermaltake's TR2 TRX-1200M PSU.

When asked what his next project might be, Popa confides, "I haven't started work yet on a new one, officially. I have some ideas I'm playing around with, like a mag-lev motherboard, or a hovercraft case . . . a gaming computer that could go over land and water would be fun." You heard it here first, folks. ■





Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you \$1,500 and a one-year subscription to CPU.

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

Each month we dig deep into the CPU mailbag in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable? CPU's "Advanced Q&A Corner" is here for you.

Alan R. asked: I'm interested in exploring the quick responsiveness of SSDs; now that they're a bit more mature in the market, performance has come up and prices have come down. Also, I'm a total speed freak in every sense of the word, squeezing whatever I can out of each area of my systems. So, if I make the investment in solid-state storage, I'm going in big. I'd like to set up a RAID 0 array of two to four SSDs and just configure it with my onboard ICH10R controller I have on my X58-based Asus P6T6 WS Revolution.

However, I'm very concerned about reliability and life expectancy of the array. I've heard a lot of details on how SSDs have improved in speed and I've seen prices come down quite a bit since the first-gen drives, but what about the life expectancy concerns? Is a RAID 0 setup too much of a risk?

A: The life expectancy concerns you're probably thinking of are specifically related to write endurance of the average SSD. Because MLC (multilevel cell) NAND flash initially had a write endurance of as little as 10,000 write cycles, there was some concern with respect to life expectancy, especially in the enterprise server space, where drive access is significantly higher than on the desktop. SLC (single-level cell) NAND flash has about a 10X higher

write endurance than MLC, but it's also significantly more expensive. Virtually all consumer-grade SSDs on the market today are built with MLC NAND flash.

However, recent advancements in MLC NAND technology have let chip manufacturers claim a threefold improvement in write endurance, up to 30,000 write cycles. In addition, SSD controller manufacturers, such as SandForce, have developed significantly more sophisticated maintenance and wear-leveling algorithms, such that what is commonly referred to as "write amplification," or having to move and rewrite data more than once to perform a single write transaction, has become less of an issue these days, as well.

As a result, life expectancy for the average consumer-grade SSD has increased significantly over the last couple of years. Most SSDs have a 1 to 2 million-hour MTBF (mean time between failures) rating, and manufacturers are providing

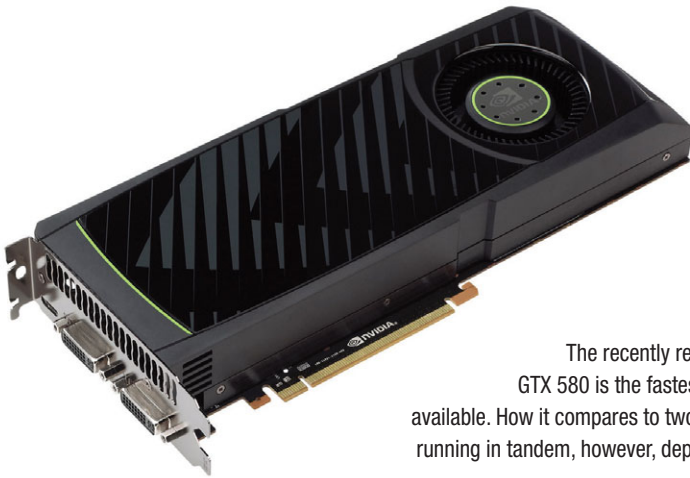
multiyear warranties now. In short, even in a RAID 0 setup, SSD life expectancy and write endurance isn't really an issue for the mainstream desktop user. In fact, we've set up four-drive RAID 0 arrays with some of the early first-generation Intel SSDs that ran for well over a year in workstation environments without so much as a hiccup.

As with any RAID 0 setup, however, we would always recommend backing up your critical data regularly or running a RAID 1 array, for critical data storage, backup, and redundancy, alongside the RAID 0 setup.

Randy D. asked: I currently have a liquid-cooled GeForce GTX 295 and was wondering how much performance I would gain if I upgraded to Nvidia's new GeForce GTX 580 (liquid-cooled, of course). My current system specs consist of a Gigabyte X58 Extreme motherboard, Core i7-940, 6GB of RAM, and a 300GB Western Digital



SandForce-based SSDs, like the Vertex 2 from OCZ, offer some of the highest write endurance and claim the lowest write amplification levels on the market currently.



The recently released Nvidia GeForce GTX 580 is the fastest single GPU currently available. How it compares to two last-generation GPUs running in tandem, however, depends on a few factors.

VelociRaptor. Would upgrading to a GTX 580 net a noticeable improvement, especially in some of the newer games like *Battlefield: Bad Company 2* and *H.A.W.X.*? And is it worth the large sticker price?

A: The answer to your question, Randy, depends on a few factors. We haven't done any direct comparisons of the GeForce GTX 295 and GeForce GTX 580, but we can draw some conclusions based on previous testing we've done between the GTX 295 and GTX 480 because the GF110 GPU at the heart of the GTX 580 is essentially just a refinement of the GF100 found on the GTX 480. Depending on the game or benchmark being tested, the GTX 295 either performs about on par with or somewhat behind the GTX 480, generally speaking. For example, in less taxing DirectX 9 titles, such as *Left 4 Dead 2*, the GTX 295 was actually a bit faster than the GTX 480 (98.58fps vs. 90.05fps at 2,560 x 1,600 with 4XAA and 16X aniso), but *L4D2* is an exception. In more taxing DX10 titles, such as *FarCry 2* and *H.A.W.X.*, the GeForce GTX 480 was faster (64.68fps vs. 57.71fps and 75fps vs. 60fps at 2,560 x 1,600 with 4XAA, respectively). In DX11 titles, we can't make any comparisons, obviously, because the GTX 295 is not DX11-capable. We should also note that moving forward, the gap between the GTX 295 and GTX 480 is

likely to grow as more games move to DX10 or DX11 and visuals improve.

With that said, the GTX 480 has some other advantages over a GTX 295, as well. Although the GTX 295 has more total memory, the GTX 480 offers more usable memory to its GPU. The 2GB on the 295 is split between its two GPUs, so each only has access to 1GB; the GeForce GTX 480's single GPU can use all of the board's 1.5GB. This doesn't mean as much at lower resolutions and/or with older games, but at higher resolutions with additional pixel processing, the additional memory will help.

Also, the GTX 480 is more likely to "just work" at full speed with newly released games, whereas the dual-GPU GTX 295 will be dependent on SLI profiles to scale performance across its pair of GPUs. And because the GTX 580 is faster than the GTX 480 across the board, the GTX 580 will offer all of these benefits as well as some additional performance. How much additional performance is going to vary from game to game, but the difference will probably be in the neighborhood of 10% to 25%, give or take. Plus, you'll be able to run DX11 titles. Whether that's worth the investment depends on your budget, but the GeForce GTX 580 would definitely be an upgrade in the cutting-edge titles you mention.

Tommy B. asked: I'm in the market for a new netbook or ultra-thin notebook.

I've been looking mostly at dual-core Intel Atom-based machines, along with a couple of CULV models, but haven't made a decision yet on what to buy. AMD recently unveiled its new low-power Zacate Fusion processor. It seems to perform very well vs. Intel's competitive chips, and I love the fact that it has a solid graphics core onboard, as well. The other consideration is price, and AMD is looking very strong there, I think. Is it worth the wait for me to see what comes on the market for Zacate-based machines? Or are they going to be close enough to Intel's offering that I can just pull the trigger on something now and not worry about it?

A: Tom, we'd offer that you sit tight for a bit, actually. By the time you read this, you'll have more thin and light notebook choices on the market than even models based on AMD's new Zacate APU (Accelerated Processing Unit). Regardless, AMD's new chip is sure to be a strong performer in the ultraportable space, if our initial testing of the company's new "Brazos" notebook platform is any indication. We've seen a Zacate-based system handily outperform a 1.8GHz dual-core Intel Atom D525-based system in terms of CPU horsepower, all while keeping pace or even occasionally edging out the accompanying Nvidia Ion 2 graphics engine (which was coupled with the Atom chip) in gaming and multimedia performance.

It was actually rather impressive to see AMD's tiny single-chip dual-core processor with onboard Radeon HD 6300 series graphics do so well against the very mature multichip Intel and Nvidia-based netbooks we tested. Also, Intel will be releasing its next-generation Sandy Bridge integrated processor around the same time Zacate-based machines hit the market. Intel is expected to take performance up a notch on its integrated graphics, as well, so you should have more than enough new mobile computing goodness to choose from very soon! ■

BY DAVE ALTAVILLA AND MARCO CHIAPPETTA,
THE EXPERTS OVER AT HOTHARDWARE.COM.

SandForce SF-2000

New Family Of SSD Processors Promises Impressive Performance

For high-tech companies touting new products, it's not uncommon for them to showcase outrageous specs and mind-blowing benchmark

results . . . obtained in a laboratory . . . that customers themselves often have no chance of duplicating in a real-world situation. When this happens to

us enough times, we tend to be wary of such claims.

However, because SandForce has already released its first generation of SSD

SandForce's Error Correction Engine

An enterprise SSD storage system, such as will be found with the SF-2600 processor, makes use of sectors of larger than 512 bytes, allowing for the storing of error correction information with each sector. The sizes can be a little odd, such as 520 bytes or 524 bytes.

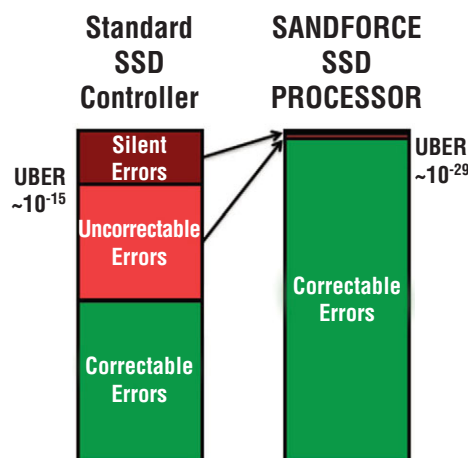
SandForce SSD controllers have always supported these odd-sized sectors, using an internal organization system. However, that internal system doesn't always align with the system that's writing to the SSD, which can cause some performance problems.

With the SF-2600, though, the processor will include firmware support for each of these odd-sized sectors, allowing the drive to monitor all system alignment issues, removing related performance problems.

Throughout the SF-2000 family, error checking and correction will occur with a 55-bit BCH error-correcting code per 512 bytes, vs. a 24-bit BCH per 512 bytes in the SF-1000.

"Fifty-five bits is much more than the flash needs today," Kent Smith, senior director of product marketing at SandForce, says. "Three years ago, 24 bits was considered overkill. Flash then required 3 to 12 bits, but it's grown today to 24 bits or more. Because our [SF-1000] technology has the ability to go [to 24 bits], something we introduced three years ago still works with something released today. The 55 bits will take [SF-2000] deep into the future."

SandForce makes use of a technology called RAISE (redundant array of independent silicon elements) to



improve the reliability of the NAND flash and to limit errors beyond what ECC already does.

"When the ECC fails, the drive says, 'Sorry, I can't get the data back,'" Smith says. "RAISE kicks in after the ECC fails. It's all done automatically. The user has no idea it's happening, and that's what you want. You don't want to have to deal with it, you just want it fixed."

SandForce classifies the errors found with NAND flash into the following three areas:

Correctable errors. Correctable errors represent the largest number

of errors in an SSD drive. Using an error correction engine, the SSD detects the error and is able to fix it.

Uncorrectable errors. With an uncorrectable error, the SSD realizes a data error has occurred but cannot find the valid data.

Silent errors. A silent error is the worst kind of error for an SSD, because it does not realize the data has an error and then returns incorrect data based on the original data error.

Compared to other types of SSD controllers, Smith says SandForce can greatly reduce the number of uncorrectable errors and silent errors by using its 55-bit BCH and RAISE. Smith adds that SandForce SSDs have 1 quadrillion fewer errors that cannot be fixed than other SSD controllers, as shown by the UBER (uncorrectable bit error rate) numbers shown here.

"Every ECC engine has the potential to incorrectly solve [an error] or miss a problem," Smith says. "Silent errors are silent and deadly. Say you go to access a bank record and you get a silent error—that can't be allowed to happen." ■

Source: SandForce

SHARK

with tri-rings effect



Evil Black Edition
(4 x Orange LEDs)

Blue Edition
(4 x Blue LEDs)

Black Edition

Devil Red Edition
(4 x Red LEDs)

White Edition
(4 x White LEDs)



12cm

12cm

12cm

12cm

12cm

14cm

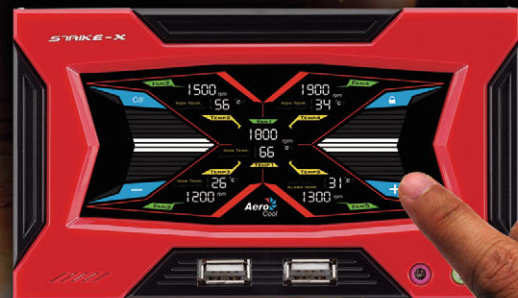
14cm



Each package includes:
1x voltage reduction cable (12V > 7V)
1x 3>4-pin connector
4x anti-vibration rubber screws
4x standard fan screws

STRIKE-X
FAN
CONTROLLER

STRIKE



With "Touch" LCD technology

Sleek X theme design | Innovative "Touch" LCD technology | Monitors and controls
5 sets of temperature and fan speed individually | LCD backlight on/off | Switch
between Celsius and Fahrenheit | Overheating alarm temperature warning | Fan
working display | "Lock" function provided to prevent careless miss-touch |
2 x USB, Mic & Headphone

Cool

Style

Function

Gaming

Toughness



Additional black face plate included

SF-1000, SF-2000 Architectures Compared

The basic architectures of the SF-1000 family and the new SF-2000 family of SandForce SSD processors are almost identical, as you can see from these illustrations.

"The 1000 and 2000 families are very similar," says Kent Smith, SandForce senior director of product marketing.

However, SandForce has made some technological changes to various components of the SF-2000 architecture, providing several improvements to the previous architecture. The changes include the following:

SATA 6bps interface. By upgrading to the SATA 6bps interface, the SF-2000 can reach performance levels of 60,000 IOPS (input-output operations per second) with 4KB random read/write data transfers, pushing read/write performance numbers to 500MBps.

"It's a balanced read and write performance," Smith says. "Most times, you'll see SSDs with a fast read performance because that's really easy. . . . What makes us different is that our write speed is so much faster."

Encryption. With the SF-1000 family, SandForce included a 128-bit AES encryption engine. The encryption engine now includes a 256-bit AES engine, along with the 128-bit engine, creating double encryption support.

Error correction engine. SandForce has increased its error correction engine with

the SF-2000, now offering 55 bits per 512 bytes. Previously, the SF-1000 family offered 24 bits per 512 bytes.

NAND interface. The SF-2000 can work with any of the major NAND flash manufacturers, as it supports legacy NAND, ONFI 2 NAND, and Toggle Mode NAND interfaces. Because Toggle and ONFI 2 both can support data transfer speeds up to 133MTps per device, SandForce can improve SSD performance by supporting those faster technologies.

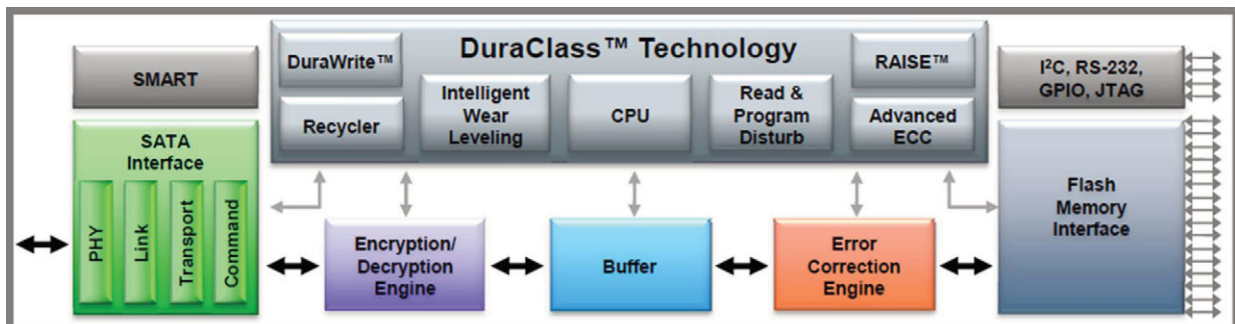
"Storage has been the bottleneck," Smith says. "We're essentially eliminating that."

These technological changes will result in expected performance improvements for the SF-2000 family of almost around twice that of the SF-1000 family. Keep in mind that because actual performance data for the SF-2000 is not yet available, these numbers in the graph below represent SandForce's projected performance. Actual testing results aren't yet available for the SF-2000. ■

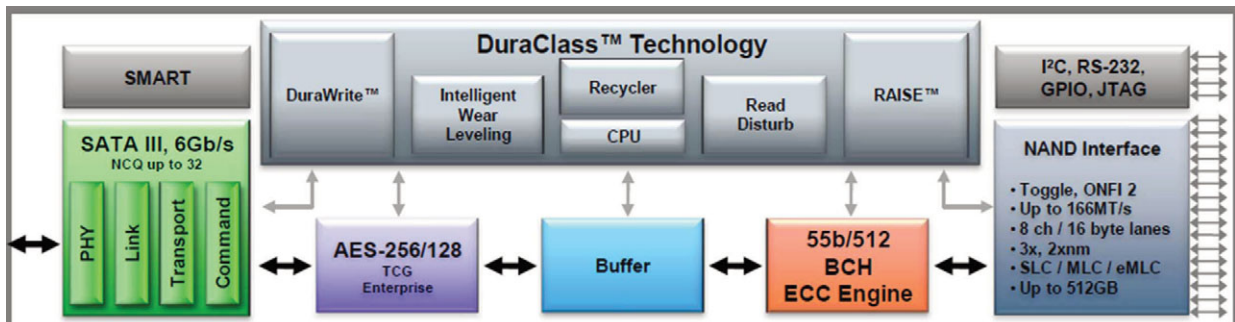
Source: SandForce

Micron 34 - cMLC - Sustained Performance (up to)	SF-1565	SF-2xxx Projected	
	Actual	Estimated	% Inc.
Seq Read MB/s (seq pre)	272	500	84%
Seq Write MB/s (seq pre)	264	500	89%
Ran Read IOPS (ran pre)	29,587	60,000	103%
Ran 70/30 IOPS	29,823	60,000	101%
Ran 50/50 IOPS	28,267	60,000	112%
Ran Write IOPS (ran pre)	27,301	60,000	120%

SF-1000 Architecture



SF-2000 Architecture



processors (the SF-1000 family) that has produced powerful performance numbers, the high-end specs attached to the recently announced second-generation SandForce SSD processor should receive far less skepticism, no matter how unbelievable the numbers are.

And they *are* unbelievable.

According to the company, SandForce's SF-2000 family of SSD processors will let SSDs reach 60,000 IOPS (input-output operations per second) and 500MBps sequential read and write speeds, all while also boasting improved reliability and lifespan. Although the numbers are only estimates from SandForce, the company's past successes make it easier to trust the numbers of the company's highly anticipated SF-2000 SSD processors, expected in the first quarter of 2011.

Enter SandForce

SandForce is a fabless silicon supplier based in California, founded a little over

four years ago. The company's primary focus is to develop processors that allow NAND flash SSDs (solid-state drives) to use MLC (multilevel cell) flash with reliability and performance levels similar to the more expensive SLC (single-level cell), although SandForce's controllers will work with SLC, too. SandForce sells the SSD processors to companies that manufacture the SSDs.

"The cost of SLC flash memory is very significant," says Kent Smith, senior director of product marketing for SandForce. "The whole reason for our existence is we can make cheaper MLC memory work as well as SLC memory."

SandForce has always been involved with SSD processors. The SandForce SSD processors make it more efficient and easier to use standard NAND flash memory in SSDs.

"Our focus is the enterprise segment," Smith says. "We start with the design that allows us to take standard NAND flash and take it to the enterprise market. . . . Starting with a high-end product and

pulling out things to reduce costs is a lot easier than going the other way."

The Move From HDD To SSD

On the surface, it would appear to be an easy choice to migrate from HDDs to SSDs. SSDs can access and transfer data far more quickly than HDDs, and SSDs can survive a shock far better than HDDs.

Then there's the speed. SSDs based on the SF-2000 family can offer 60,000 IOPS, Smith says, vs. a few hundred IOPS for a fast HDD.

"We're talking about worlds of difference between the two," Smith says.

However, the NAND flash that powers SSDs has always carried a far higher cost per GB than what you'll find with HDDs.

"The good news is that the price of flash keeps going down and down," Smith says.

SSDs' Design Drawback

Beyond cost, the lifespan of flash memory has become a problem in allowing SSDs to overtake HDDs.

SandForce's Encryption Engine

In the SF-1000 family, SandForce included an AES-128 encryption engine in CTR (counter) mode. It's an "always-on" encryption mode. (AES is short for advanced encryption standard algorithm, and it is a symmetric key algorithm that encrypts and decrypts data in blocks, such as blocks of 128 bits with 128-bit AES, for example.)

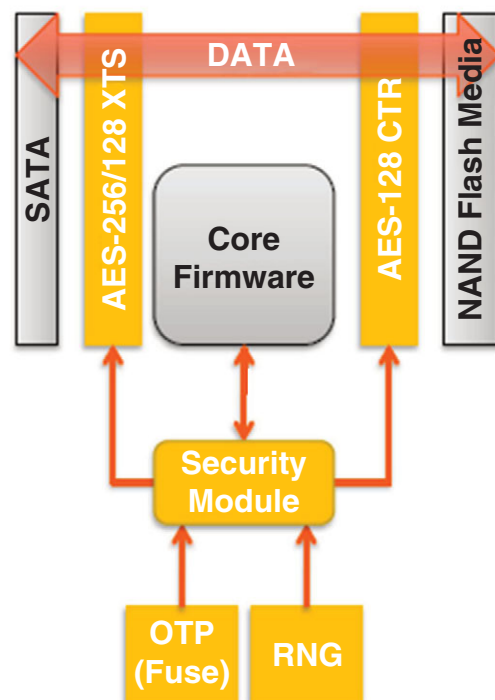
With the SF-2000 processors, SandForce will add an AES-256 encryption engine in XTS mode. XTS, short for XES-based (Xor-Encrypt-Xor) TCB (Tweaked CodeBook) mode with CTS (CipherText Stealing), was approved by the National Institute of Standards and Technologies early in 2010.

The SF-2000 family will be able to run both types of encryption at the same time, supporting double encryption. The AES-128 mode will allow for strong, always-on encryption, while the AES-256 mode will allow for different encryption keys for each of the drive's several address ranges.

The firmware included with the SF-2000 will provide a variety of features, including a deterministic random number generator and signature verification.

Plus, "encryption is placed in the drive at the hardware level," Kent Smith, SandForce senior director of product marketing, says. "There's no CPU impact." ■

Source: SandForce



With flash memory, an SSD cannot overwrite existing data. Instead, the SSD writes data to empty pages, which are usually 4KB each. When erasing data, the SSD drive must erase data in blocks, which usually consist of 64 pages per block (256KB). Even if only a couple of pages in the block need to be erased, the SSD must erase the entire block. The SSD must write the data it wants to preserve from inside the block to a new area of the SSD before erasing the block. This process can result in rewriting the same page of data several times, moving it from block to block, even though the data doesn't change.

The SSD processor controls this technique by interfacing between the flash memory and the system. However, because flash has a limited number of times it can be programmed and erased (P/E cycles), this technique, if not managed well, can lead to a shorter lifespan for the flash memory.

"When you change a bunch of pages, you must move the good data pages into a new block," Smith says. "You write more times to flash than originally requested. You're going to burn it out faster."

This "burn out" phenomenon is called write amplification. SSD companies recently began assigning a value for write amplification, where a lower WA value should produce an SSD with a longer P/E cycle lifespan than an SSD with a higher WA value, assuming all other aspects of the SSDs are similar. The WA value compares the amount of data the drive must rewrite to the amount of data originally written by the system.

SandForce uses a technology it calls DuraWrite in its SSD processors to reduce the WA ratio of its partner companies' SSDs to below 1.0. Basically, DuraWrite uses a series of proprietary algorithms to allow the SandForce SSD controllers to use significantly fewer write cycles than standard SSD controllers.

Although Smith says he cannot go into great detail about how DuraWrite works,

he says it uses a formula similar to data compression software, storing duplicate data in a "shorthand" manner. By cutting down on the amount of data stored, DuraWrite doesn't have to rewrite the data bit for bit when it's moved.

With its SF-1000 family, SandForce announced a WA ratio of about 0.5, and Smith says the SF-2000 will duplicate that WA ratio. Before SandForce's announcements, the SSD industry considered 1.0 to be the ideal WA ratio.

"It's been over 18 months since we announced a write amplification value of less than 1.0, and we're still the only ones," Smith says. "It wasn't easy. Imagine a car company says, 'We have a 100 mpg car, and we don't use electricity.' Most people would say that it couldn't be done."

The Power Equation

Some cities that host data centers are placing limitations on the amount of power they're allowed to use, Smith says, which leaves the data centers with two options: Build additional data centers in other cities or figure out how to use less power within the data centers they already have.

Smith says the SandForce SSD SF-2000 processors can help with this problem, too.

"We have added the ability where you can tune the power:performance ratio," he says. "You can turn a knob in the controller in the SF-2000 family to set the maximum power, and then the chip will maximize the performance with that much power in use."

Smith says some who try to compare SSDs to HDDs sometimes mistakenly downgrade SSDs for power consumption. However, according to Smith, SSDs tend to use a large amount of power but in short bursts, while the HDDs use a steady amount of power over longer periods of time. He indicates that SSDs actually generate more IOPS per watt of power consumed than HDDs.

"The key for any SSD is to use less power than a hard drive," Smith adds. "It's difficult for an SSD not to use maximum power consumption at any

particular moment. The SSD gets so much done in a short time that it's more of a power spike, and then it shuts down. The HDD did only 'X' in that short time, while the SSD did 40 times 'X.' Over the full endurance test, [the SSD] uses a lot less power."

SF-2000 Release Plans

The first set of SF-2000 family chips, which should arrive early in 2011, will not be initially available in consumer devices. The SF-2300 will be an industrial and military version. The SF-2500 and SF-2600 both will be enterprise chips; the SF-2500 is aimed at SATA drives, while SandForce designed the SF-2600 for SAS drives. All three have the same performance levels but will offer slightly different features. The SF-2300, for example, will work in extreme environmental conditions.

SandForce should announce plans for its SF-2000 consumer-level chips early in 2011. At least one version of these chips should provide a performance level similar to the announced enterprise and industrial chips.

The company's SF-2000 processors will continue to work with flash from a variety of manufacturers, including Hynix, Intel, Micron, Samsung, and Toshiba.

"We designed it to be universal," Smith says. "As they keep changing their technologies, we're meeting those changes. Our flexible architecture enables us to work with all of those guys."

Smith adds that the flexible nature of the SandForce SSD processors makes it easier for SandForce to adjust to new flash technologies, such as Toggle Mode NAND.

"We have a great relationship with all of our flash vendors," Smith says. "We want to make all of them work well. The idea going forward is to continue with these newer, faster flash technologies. That memory had better be tip top, or it will become the bottleneck." ■

BY KYLE SCHURMAN

**World's First
450Mbps
Router!**



**Win a Wireless N
Gaming Adapter**
at www.trendnet.com/giveaway
Enter Code CPU to Double Your Prizes



**450Mbps Wireless N
Gigabit Router
TEW-691GR**

Extreme Speed

Experience unmatched wireless performance with 450Mbps wireless n

Going the Distance

A record 9 radio spatial streams produce a 200% increase in wireless coverage as compared to 300Mbps routers

One Touch Networking

Wi-Fi Protected Setup (WPS) integrates other WPS supported wireless adapters at the touch of a button



©2010 TRENDnet All rights reserved

amazon.com

Buy.com



MICRO CENTER
The Ultimate Computer Store

NCIX.com

PROVANTAGE



TigerDirect.com

MERCURY FALLING

A COMPREHENSIVE GUIDE TO TACKLING TEMPS

62 Establish Some Cool
Map Out Your Thermal Plan Of Attack

66 What Type Of Watercooler Are You?
We Break Down Your Liquid Refreshment Options

70 Frozen Assets
CPU's Cooling Gear Buying Guide

You wouldn't be here if you didn't want more power. Whether your aim is more frames per second in *Aliens* vs. *Predator* or crunching through high-def video compression in record time, you're on a never-ending quest for an ever-higher-performing system. Some of you will simply hop on the hardware upgrade highway and enjoy the smooth ride (not that there's anything wrong with that). Others, though, journey along a riskier, less absolute path: performance modding, typically overclocking.

To be sure, overclocking your core components is typically more cost-effective than simply dropping a few hundred on the current flagship. But that extra performance ain't free by a long shot, sonny. Running at speeds beyond stock inevitably produces more heat, and you need an answer for that if you don't want those components to burn out prematurely, sometimes literally. That answer is . . . you already know the answer.

What excites us the most about taking on a total system cooling overhaul is the sheer number of options we now have at our disposal. In addition to the time-honored—if somewhat pedestrian—standbys, heatsinks and fans, mad scientist enthusiasts have gone so far as to completely submerge their systems' innards in mineral oil. That's commitment to cooling.

Now, it's OK if your commitment doesn't run that deep (or unctuous). Still, though, for a lot of power users, system cooling stops at "good enough," so why leave that potential extra performance on the table? This month, we devote our time to serving up improved performance on the rocks. We'll start with an in-depth look into the advanced basics of proper thermal management. For example, do you know if your current hardware setup is creating unnecessary hot zones? Are your fans pushing air through your system as effectively as possible? And if either or both of these

are indeed causing an unnecessary heat wave, what's the best way to remedy the situation? Those of you who do fall in the "good enough" crowd should reap immediate benefits from the tips offered in "Establish Some Cool," starting on page 62.

Next, in "What Type Of Watercooler Are You?" we take a look at the vast world of liquid-cooling. Over the last couple of years, this world has been inundated by a relatively new breed of watercooler: the closed-loop cooler. Basically ready to be dropped into a system right out of the box, closed-loop coolers such as CoolIt Systems' Vantage A.L.C. and Corsair's H70 have neither muss nor fuss when it comes to maintenance and installation. That being said, how do these upstarts compare to the traditional watercooling setup of separate waterblock(s), tubing, fittings, radiator, pump, reservoir, and coolant? Although fundamentally similar, these two approaches are also markedly different, and selecting the right one for your machine involves a number of considerations. We break down the differences and offer our recommendations on page 66.

Once you've finished that coverage, it's time for the goods. As we've said, the volume of choices available to bring system temps down to frosty levels, relatively speaking, is simply staggering. Canvassing the entire landscape of cooling hardware is naturally impossible, but we've drilled down and excavated a core sample. We present our findings (which consist of heatpiped air coolers, closed-loop coolers, graphics card and notebook coolers, watercooling kits, and even a phase change unit) to you in "Frozen Assets," on page 70.

It's fun to light up the benchmark scoreboard with big numbers. It's even more fun lighting up your FPS competition with help from your high-powered rig. Lighting up your rig itself because you didn't pay close enough attention to your thermals, well, that's not fun at all. Let's have a look at what you need to do to put heat in its place. ■

BY VINCE COGLEY

IT'S FREE

STEP 2. Click on Register

STEP 3. If you're already a registered user of ComputerPowerUser.com, simply enter your username and password, otherwise, please register in the form provided. Now you're set to receive the digital issue as soon as it's available each month.

THE SAME GREAT CONTENT 10 DAYS
BEFORE THE PRINT ISSUE ARRIVES!

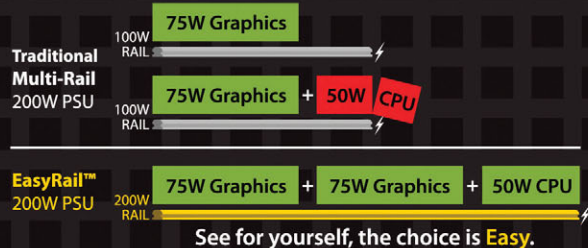


One Rail One Setup

EasyRail™ Technology Provides Maximum Power

Unique, continuous EasyRail™ technology enables you to maximize available power and make set-up easy. Stack numerous power-hungry components, such as your GPU, CPU and other components, without fear of crashing. It's also a perfect solution for hardcore gamers.

The world's only PSUs with EasyRail™



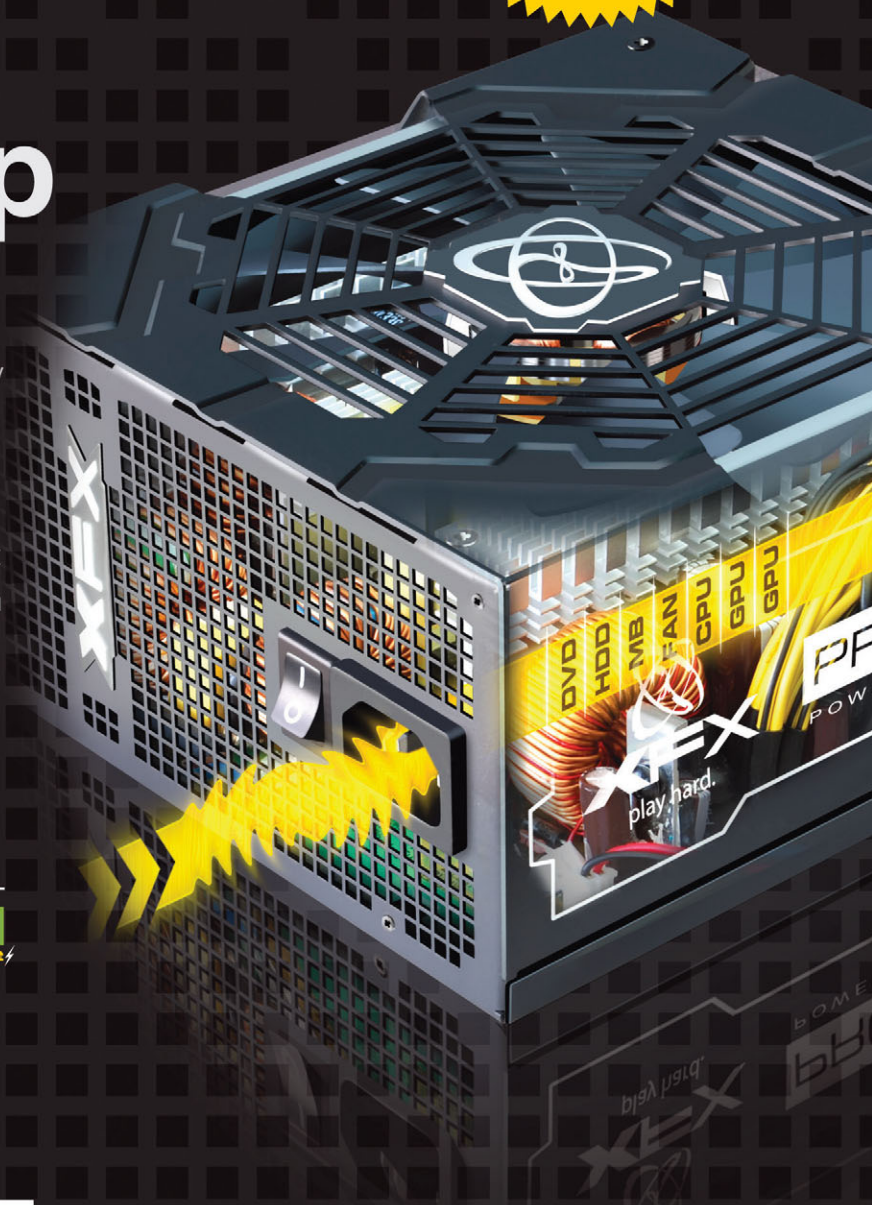
650W | 750W | 850W

PROSERIES

CORE EDITION FULL WIRED



Awards



For special buying tips.
Text 'scan' to 43588
or go to www.getscanlife.com
on a mobile phone for free app

XFXforce.com/PSU for more info

ESTABLISH SOME COOL

MAP OUT YOUR THERMAL PLAN OF ATTACK

For almost as long as there have been personal computers, there have been enthusiasts eager to modify them. In fact, one could argue that the PC modder spirit has been around even longer than the PC itself. Consider this: The gang at the Homebrew Computer Club had been swapping what were essentially mod ideas for business-class systems well before Steve “Woz” Wozniak debuted the design that would eventually become the Apple I at one of the club’s meetings all those years ago.

Like almost everything in the PC scene, the aforementioned modder spirit has evolved over time. The enthusiasts of old who frequented the Homebrew

Computer Club had less to work with and focused their attention on optimizing circuit designs and driving costs downward to make computers more affordable and easier to use for everyday consumers. The majority of today’s modders tend to poke, prod, and tweak their systems to optimize multiple aspects of performance. Nowadays, we modders overclock our rigs, lap and polish our heatsinks, incorporate funky lighting, and perform countless other mods to customize and enhance our systems.

Perhaps the most widespread PC mods today pertain to system cooling. Cooling mods are popular because many of them

are relatively easy to perform and offer immediate, tangible benefits. An efficiently cooled system will operate at lower temperatures, which should result in better stability, potentially higher overlocks, or even increased component longevity—good things all around. Most commonly, modders tend to swap out or add case fans and/or divide their cases into zones in an effort to better cool their systems.

Although seemingly innocuous, modifying a system’s fan configuration is rife with pitfalls, which must be considered. The positions of the intake and exhaust fans are important, as are the pressures they create and their proximity to vents and other openings in the case. With some planning and an understanding of positive and negative air pressure, however, designing an effective, zoned air-cooling configuration is relatively easy. We’re in your corner to lay the foundation.

Under Pressure

Most case fans carry a few ratings, specifically current draw or power, speed or RPM, noise level, and CFM or airflow. All of these things are intertwined in one way or another. For example, all other things being equal, as a fan spins faster, it will draw more power, create more noise, and move more air.

Evaluating all of these aspects are important considerations for any build, but arguably the most important is the airflow



PC cooling fans come in many shapes, sizes, and colors, but they all serve the same fundamental purpose—moving air. Balancing the physical and acoustic attributes of the cooling fans, along with the air pressures they create, will result in an optimal cooling scheme.

rating. Why? Because the more air a fan can move, the more pressure it can create within an enclosure. And managing the pressure is paramount to strong cooling performance. Let us explain.

Virtually all high-performance PC cases on the market today will have a number of fans waiting for you within. A few will be used as intake fans, which pull outside air into a case; others function as exhaust fans, or fans that expel air from within the case to the outside. When a case has intake fans that produce more internal pressure within a case than the exhaust fans can expel, the case is said to have positive internal pressure. Conversely, when a case has exhaust fans that can push more air from the case than the intake fans can pull in, the case is said to have negative internal pressure. In the vast majority of circumstances, for ideal performance, case fans should be configured in such a way that they produce positive internal pressure.

It is important to understand the concepts of positive and negative air pressure within a case for a couple of reasons. Many of today's high-performance cases have multiple vents/fans on all sides of the enclosure. Some may even have entire panels made from metal mesh that allows for easy airflow into and out of the case. Positive pressure is ideal because it will constantly force air from within the case out from not only the exhaust fans but also these vents (or the mesh). If the case has negative pressure, it will constantly pull air in through the vents (or any other odd opening from around the case) and bring various undesirables, such as dust or pet hair, along with it. Because of this, positive internal pressure will ensure that heated air from within a system is constantly being pushed out of the case. Further, none of the previously mentioned contaminants are pulled into the case, and the case's intake fan filters will remain effective.

Maintaining positive internal air pressure is relatively simple, but not without a few nuances. To maintain positive pressure, the combined CFM, or airflow rating, of all intake fans must simply be higher than the combined CFM of all exhaust fans.



Many high-performance PC case manufacturers are mindful of fan positions, vents, and the positive and negative air pressures associated with both. A good case will have minimal "dead zones" (where there is little to no air movement), strategically placed vents, and a balanced assortment of case fans that creates positive pressure within the chassis.

Illustration courtesy of Cooler Master

If you bought a quality case loaded with preinstalled fans, the manufacturer will have hopefully done that math for you; the case will have positive internal air pressure from the get-go. If you're modding a case or starting a new build from the ground up, though, be prepared to do a little addition and subtraction.

Also, keep in mind that there may be other exhaust fans in a system that are not part of the case itself, such as a high-end graphics card's or a power supply's fan (depending on the PSU's orientation within the case). It isn't uncommon for a high-end graphics card cooler to move upward of 100cfm or more when running at its maximum speed, so be sure to keep that in mind during the planning phase of your next air-cooled build.

So, for example, if you have two exhaust fans that can push 80cfm of air and a GPU fan that can push out 100cfm, then the combined CFM rating of all intake fans must exceed 260cfm, preferably by at least 10% to accommodate for potential tolerances at the manufacturer. (Two identical case

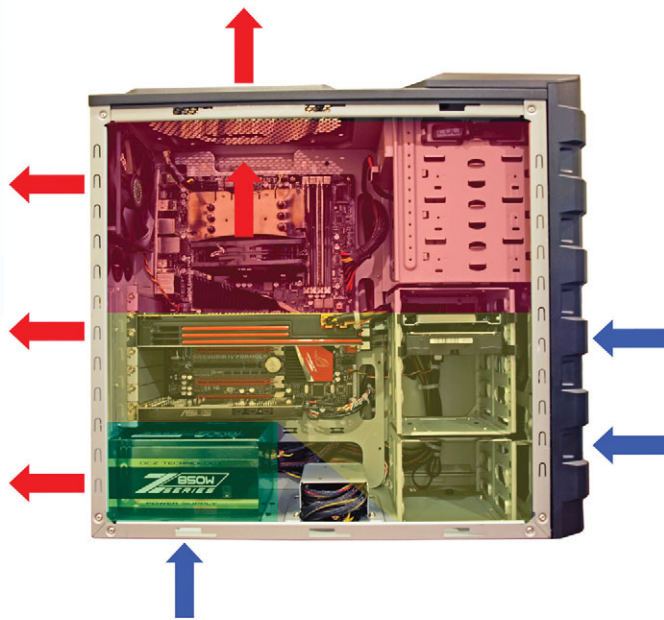
fans with the same CFM rating may not perform identically due to subtle differences during manufacturing.)

It's Just Science

In addition to managing the positive and negative pressures created by case fans, positioning the fans properly requires some know-how. (Admittedly, though, when enough air is being moved within a case to maintain positive internal pressure, some of the general rules of thumb we're about to outline here can be broken.)

We all know from elementary school science class that hot air is less dense and hence lighter than cold air. As a result, hot air rises. We also know that most systems have exhaust fans at their rear, whether they are case fans or exhaust fans from a GPU or PSU.

With that in mind, it should come as no surprise that in most circumstances intake fans should ideally be placed at the front of the case in the lowest positions available. There, they can draw in the coolest air. It follows that exhaust fans should be placed at the highest points possible on the rear of



When outfitting a modded system with upgraded or additional fans, there are a number of things to consider in addition to the chassis-mounted intake and exhaust fans. The pressures created by a GPU fan that exhausts hot air, the power supply fan, and side-panel vents all play a role in a case's cooling configuration.

the chassis to blast heat out of the system and away from the intake fans.

Along with proper intake and exhaust fan placement, however, other internal fans, such as a CPU heatsink's fan(s), should be positioned so they blow heated air upward or toward the nearest exhaust fan whenever possible. The goal is to keep a consistent flow of cool air into the system, maintain positive internal pressure, and have that heated air forcefully expelled from the system as quickly as possible.

Sometimes it helps to divide a case into different zones, each with its own set of cooling requirements that need to be taken into consideration. We've created a color-coded image using a common case layout to illustrate what we mean.

As you can see in our example, there are three distinct zones in our case. Due to its placement at the very bottom of the case, just above its own dedicated vent, the PSU is effectively in its own zone. The PSU's cooling fan draws cool air in from underneath the system, it passes over the PSU's internal components, and it is immediately expelled from the case. Next is the expansion card and drive area, which is effectively cordoned off by the graphics card. Some of the air drawn in by the case's intake fans blows directly over the cards

and drives (and motherboard's heatsinks), where it is exhausted by the graphics card cooler. The final zone resides at the top and contains the CPU. In our case, the CPU cooling fan blows air directly upward toward a vent, with a little assistance from the case's front intake fans and also from an intake fan mounted on the case's side panel (not pictured).

Special Considerations

Along with all of the aforementioned examples, there are always special circumstances to consider, as well, for example, if water or a passive heatsink is being used to cool the CPU. Many modders mistakenly assume that if their CPU is being liquid-cooled and running at ultra-low temps, all is well. But many motherboard manufacturers design their chipset and VRM cooling to rely on residual airflow from a CPU cooler. So, if you've used liquid-cooling to minimize the number of case fans in your system, be sure the VRM and chipset are still being adequately cooled, too.

Also, keep in mind that with air- or liquid-cooling, if no other means are being used to actively cool the air or liquid, the lowest temperature you'll ever be able to theoretically hit is the ambient

temperature of the room the system itself is in. If a system is kept in a closet that regularly reaches 90 degrees Fahrenheit in the summer months, no matter how much air (or water) is pumped through the system, the lowest temperature any component could theoretically reach is 90 F. This is why data centers are climate-controlled and kept cool.

Put It To The Test

So, how do you know you've done everything right—that a case has positive internal pressure and your air-cooling scheme is up to snuff? Well, first and foremost, check not only CPU and GPU temperatures but also chipset and case temperatures. As usual, the lower the better, and case temperatures in particular should be much lower than the CPU or GPU temps. Ideally, the case's temperature should be closer to the ambient room temperature than the CPU or GPU temperatures, but everyone's mileage will vary based on ambient room temperature and how much air is being moved through the system.

A quick—if low-tech—way to test if your case has positive internal air pressure is to drop a piece of dry ice in a cup of warm water and set it next to your case's front intake fan; the "smoke" should blow through the system and out the back. If it doesn't, then upping the performance of the intake fans may be necessary. This trick is also useful for determining if there are "dead zones" within your case (if the case has a windowed or acrylic side panel and you don't remove the side panel, which throws off the internal pressure of the case).

As is the case with most PC mods, the deeper you dig, the more complex they become. That seemingly simple case fan isn't an island that operates independent of its surroundings, but rather a single part of a sophisticated cooling scheme. Hopefully we've laid the foundation to help our fellow modders tackle their air-cooling mods and improve system temps. If we did, and those temps are nice and low, you could always do some other modding, such as, shall we say, a little overclocking? ■

BY MARCO CHIAPPETTA



ENERMAX
POWER. INNOVATION. DESIGN.

NAXN

ENTER A NEW GENERATION



UNLEASH THE POWER

ENM750AWT	750W	82+
ENP600AWT	600W	80+
ENP500AWT	500W	80+
ENP550AWT	550W	
ENP450AST	450W	
ENP350AST	350W	

ECOMASTER

www.ecomastertek.com

Like Us On
facebook

amazon.com

Buy.com

DIRECTRON.COM

newegg.com

frigo.com

MICRO CENTER
computers & electronics

WHAT TYPE OF WATERCOOLER?

ARE YOU?

WE BREAK DOWN YOUR LIQUID REFRESHMENT OPTIONS

Liquid-cooling has become much more affordable and accessible as of late. Years ago, enterprising modders were scouring the Internet, auto-parts stores, and even pet shops to cobble together completely custom liquid-cooling systems. Today, buying a kit requires little more than pointing a Web browser to any enthusiast-friendly PC hardware e-tailer.

As a result, the popularity of liquid-cooling has skyrocketed, and one could argue that it has now—dare we say it—gone mainstream. If you need further proof of liquid-cooling's acceptance, consider that Dell and HP both offer liquid-cooled systems in their product stacks. If that isn't mainstream, we don't know what is.

On the do-it-yourself front, though, there are two distinct types of liquid-cooling

systems: completely self-contained, closed-loop coolers and custom kits assembled piece by piece. Each type of liquid-cooling system has its own merits and drawbacks, but ultimately they are all quite similar in terms of their core composition.

With all of the hardware currently on the market, choosing the right type of liquid-cooler can be a little daunting, so we thought it would be a good idea to compare and contrast closed-loop and custom liquid-cooling offerings. When we're finished, you should be armed with a better sense of what's out there and what each liquid-cooling option does and doesn't offer end users. But first, let's start with a quick primer.

Liquid-Cooling Lowdown

Whether it's an inexpensive, closed-loop kit or a cutting-edge custom DIY solution, all liquid-cooling systems consist of the same basic set of parts. The parts may not look or perform the same from kit to kit, but all liquid-cooling solutions currently on the market include a water pump, a waterblock, a radiator, and a

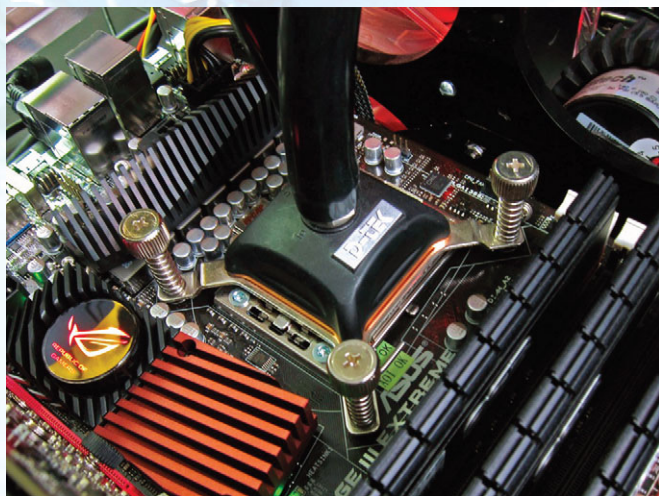
An update to the popular Hydro Series H50, the more powerful Corsair Hydro Series H70 improves upon its sibling in almost every way. The H70 features an improved cold plate that allows for easier mounting, a higher-performance radiator with approximately twice the surface area, dual fans in a push-pull configuration, and more flexible tubing for easier installation.



CoolIT Systems offers a wide array of self-contained liquid-coolers in its Eco A.L.C. line to accommodate a variety of cases and installation options, including models with oversized radiators, such as the Eco C240, or more compact and affordable offerings, such as the Eco C80.

reservoir, all linked together by some tubing. The water pump is responsible for circulating the liquid through the cooling loop. The waterblock(s) makes physical contact with the CPU and/or other components and facilitates heat transfer into the liquid. The radiator dissipates heat into its surrounding area and cools the liquid running through the loop, a process that's usually assisted by at least one cooling fan. And the reservoir holds a given amount of liquid that keeps





There are a myriad of CPU waterblocks on the market currently, and at a wide range of prices. For our custom liquid-cooled rig, we used a high-end D-Tek Fuzion v2 CPU block, which features a high-flow design with an all-copper baseplate that sports over 340 dense Rounded Nano Pins for highly efficient cooling.

the loop full and the pump fed. Liquid circulates through the loop, where it absorbs heat from the waterblock and is ultimately dispersed via the radiator.

Closed-loop liquid-coolers are self-contained units that have all of the aforementioned parts. Custom solutions require users to either purchase kits containing select components or acquire the parts individually and assemble them themselves.

Pros & Cons

There are pros and cons to either liquid-cooling configuration. Closed-loop kits are attractive to many users because they are completely self-contained, preassembled, and relatively affordable. Many closed-loop liquid-coolers are available in the \$69 to \$149 price range from well-respected manufacturers, such as CoolIT and Corsair. Closed-loop kits also require little to no maintenance. They are pretested at the factory for leaks and are typically easy to install. With the majority of current-generation closed-loop kits, installing them is no more difficult than mounting a fan/radiator assembly and affixing the waterblock to the processor.

Drawbacks to a closed-loop kit include customization—there really isn't any. Closed-loop kits are meant to be used as configured from the factory and typically only cool one or, in some cases,

two components. The majority of them also look rather plain in comparison to tricked-out custom setups.

Conversely, the big benefit of a custom liquid-cooling kit is the sheer variety of available options. There are many different waterblocks, radiators, reservoirs, and pump options on the market at a wide range of prices. Custom solutions can also be tailored specifically for certain cases and system configurations. Many system components, such as the CPU, GPU, and chipset (among other components) can be liquid-cooled, as opposed to the CPU and GPU, which are essentially the only components you can cool with a closed-loop cooler. Parts are also available to suit almost any budget.

One of the downsides to custom liquid-cooling systems, however, is their installation: Setting up a custom loop can be a real pain in the neck. Each waterblock has to be mounted, tubing cut to size, and fittings connected perfectly to prevent leaks. And there's no universal guide to guarantee success. Users must fill the loop manually and be mindful of every part in the loop, because mixing certain metals (such as copper and aluminum, for example) can cause reactions that will result in corrosion.

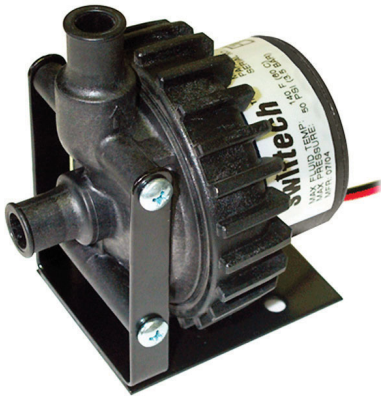
Performance is a wild card with custom liquid-coolers. Because custom kits can consist of a multitude of different components and geared for an array

of applications, performance can vary wildly. Suffice it to say, however, a custom-assembled loop does have the potential to significantly outperform any preassembled, closed-loop cooler.

The Players

The closed-loop liquid-cooling market is currently dominated by three major players—CoolIT Systems, Corsair, and Koolance. (Koolance also offers a wide range of parts that can be used in custom systems.) There are a multitude of other options out there from others—such as Asetek, which actually manufactures some of Corsair's offerings—but hit any forum or major e-tailer and you'll find the lion's share of buzz regarding closed-loop solutions includes these companies. Koolance is known for its high-performance external offerings, while Corsair and CoolIT (and Asetek) are known for their much more compact and affordable coolers, such as the Hydro Series H30, H50, and H70 (Corsair) or the Eco A.L.C. (CoolIT).

Custom liquid-cooling setups are available from a wide range of companies including Thermaltake, Danger Den, D-Tek, EnzoTech, Swiftech, ThermoChill, Hydor, and many others. Further, there are companies that are enthusiast favorites within each component category. The great thing about a custom solution is that users can piece together their favorite parts from virtually



Many of the high-end water pumps available for custom liquid-cooling kits offer flow rates that far exceed the smaller pumps incorporated into closed-loop kits. Of course, the standalone pumps are much bigger and more expensive, too, with some costing as much or more than the CoolIT Eco A.L.C.

any company and tune the loop to perform according to their precise specifications.

Liquid-cooling still isn't for everyone, but for users looking to test the waters, so to speak, one thing is certain: Whether an easy-to-install, closed-loop cooler or completely tricked-out custom kit suits your fancy, there are a smorgasbord of high-quality options currently available that will fit virtually any user's needs.

If you're thinking about taking the plunge, closed-loop kits give users an easy way to dip their big toes before getting wet, while the more hardcore looking for a custom solution can just do a cannonball and dive right in. ■

BY MARCO CHIAPPETTA



One of the advantages of building a custom, DIY liquid-cooling kit is the ability to use a relatively large reservoir. When a large reservoir is paired to a high-flow pump and efficient radiator and waterblock, the likelihood of saturating the loop during periods of heavy load is drastically reduced.

Liquid-Cooling Cage Match: Corsair Hydro Series H70 vs. Custom Liquid-Cooling

To see what kind of performance increases, if any, we could gain by assembling a custom liquid-cooling kit using high-end components, we tested the Corsair Hydro Series H70 alongside a mish-mash of products from D-Tek, ThermoChill, Laing, and EK Water Blocks. And, for good measure, we also tossed a stock Intel Extreme HSF into the mix to illustrate the performance benefits both would offer over basic air-cooling.

Our test system consisted of an Intel Core i7-980X Extreme processor installed in an Asus Rampage III Extreme motherboard, with 6GB (3 x 2GB) of OCZ Blade DDR3-1866 memory and an Nvidia GeForce GTX 480 graphics card. A Corsair HX1000 PSU powered all of the components.

The custom loop kit consisted of a D-Tek Fuzion v2 CPU waterblock, paired to a ThermoChill PA120.3 Triple 120mm radiator with six 120mm Yate Loon D12SL-12 low-speed fans attached in a push-pull configuration, a Laing D5 12V DC water pump, and an EK Multioption 400mm reservoir—all linked via half-inch (inner diameter) tubing. As we've mentioned, for closed-loop performance, we used the Corsair Hydro series H70, which represents one of the better-performing kits on the market.

We tested the Core i7-980X at stock settings (3.33GHz/133MHz x 25/1.17V) and while overclocked to 4.27GHz (133MHz x 32) with a voltage of 1.38V. Throughout testing, we disabled C1E, SpeedStep, and Turbo

Mode to prevent unwanted changes in the CPU frequency. We recorded idle temperatures while the system was sitting at the Windows Desktop, drive activity had stopped, and the CPU temperature had stabilized. We recorded load temperatures after taxing the processor with multiple loops of the Cinebench R11.5 CPU test, once again, after the CPU temperature stabilized. We relied on AIDA64 to monitor the processor's temperature.

The first thing that's immediately apparent looking at the performance of either liquid-cooler vs. the stock Intel cooler is the huge temperature disparity—the liquid-coolers simply blow the air cooler out of the water (no pun intended). At the 980X's stock frequency, idle temperatures are similar for all of the coolers, but once under load, the liquid-coolers outperform the stock cooler by a minimum of 15 degrees Celsius. With the CPU overclocked to 4.27GHz, the stock cooler couldn't even keep the system stable under load, whereas the liquid-coolers had no trouble at all.

We should also point out that the custom kit outperformed the Corsair H70 by 5 C while the CPU was overclocked, but there's more to the story than only temperatures. The custom liquid-cooled configuration, although much more expensive than the H70 (about \$350 vs. \$99), was also significantly quieter. The H70 isn't a terribly loud cooler by any means, but its dual fans were noticeably louder than the six low-speed Yate Loon fans we used on the custom build. So, in addition to increased performance, the custom loop resulted in lower noise.

The better performance and acoustics of the custom kit required a much larger monetary investment, and the installation was exponentially more difficult; that said, we suspect hardcore modders with the necessary budget will justify the tradeoff. ■

	Idle	Load
Stock @ 3.33GHz		
Intel Extreme HSF	22 C	52 C
Custom loop	21 C	36 C
Corsair Hydro Series H70	21 C	37 C
Overclocked @ 4.27GHz		
Intel Extreme HSF	24 C	Fail
Custom loop	22 C	51 C
Corsair Hydro Series H70	23 C	56 C

Antec One Hundred & Antec Six Hundred

Two Reasons To Build Your Next System Right Now



Antec Six Hundred
www.antec.com



Antec One Hundred
www.antec.com

Antec has a solid reputation for creating well-engineered components, which is why when enthusiasts go hunting for a new enclosure, Antec is typically at the top of the list. With the arrival of the new Gamer Series Six Hundred and One Hundred chassis, the hardest part of your next build may be choosing which one to go with.

THE ANTEC SIX HUNDRED keeps the pomp and flash to a minimum and is exemplary of successful industrial design. The vented acrylic window shows off your components and hosts an optional fan to exhaust excess heat from high-end graphics cards. A wire mesh-dominant front panel houses your intake fans and features washable filters. And the visually striking top panel hosts a 200mm TriCool blue LED fan that blasts your major heat-producing parts with cool air. Another of the Six Hundred's enthusiast-centric features is the 2.5-inch HDD caddy built into the front panel, completely wired and ready for you to hotswap your SSDs as you see fit.

THE ANTEC ONE HUNDRED eschews the traditionally gaudy gamer accoutrements for classy, understated visual appeal. The uniform mesh front panel allows for maximum airflow and gives the case a distinctive look. But don't let the windowless side panels or lack of LEDs lull you into thinking that this is anything but a builder-friendly enclosure. Inside you'll find a floor-mounted SSD bay, a pair of 140mm front-panel intake fans and a 120mm rear-panel exhaust fan, and room enough for seven HDDs and three ODDs. Up top are four front USB ports and one of a builder's favorite features, a top-mounted accessory tray, which takes the frustration out of the first build and future upgrades.

FROZEN ASSETS

CPU'S COOLING GEAR BUYING GUIDE

One not-so-obvious benefit of periodically poking your head in on the cooling scene is witnessing the vast amount of engineering and technological cleverness on display, no matter your experience level. You don't have to have a master's degree in overclocking, for example, to appreciate the boundary-pushing expertise that numerous CPU coolers from numerous companies exhibit, all with the same goal of efficiently and effectively removing heat.

An obvious benefit of staying abreast of the cooling landscape is learning which equipment you can implement to take your builds to bigger and better performance while simultaneously safeguarding your investments. The following highlights some of the best and brightest cooling gear now available.

Aerocool Shark 12cm Black Edition

\$14.99 | www.aerocool.us

Beyond possessing a curved, shark fin-like shape, each of the 15 blades on Aerocool's Shark also sport three raised notches. Combined, the design results in impressive air pressure and airflow, especially in Power mode (12V; 26.5 dBA). If you favor silence



over performance, you can tame the Shark's bite by moving to Silence mode (7V; 12.6 dBA) using the included 10.5-inch voltage-reduction cable. Aesthetically, all wiring, including the included 3-to-4-pin converter, is neatly sleeved in black. Construction-wise, the plastic (yet durable) Shark uses Aerocool's Fluid Dynamic Bearings, which Aerocool states results in a longer lifespan and antishock abilities. Also available in 14cm models, the Shark comes in multiple colors with quad-LED lighting. (LED lighting is absent on the Black Edition.)

Aerocool Strike X Panel Fan Controller

\$59.99 | www.aerocool.us

OK, so the Strike X Panel doesn't do any direct cooling. It does a damn fine job of detailing how well your equipment is cooling, however. Part of Aerocool's Strike X Gaming Series, the controller needs two 5.25-inch bays but forgoes knobs and dials in favor of touchscreen control over five fan channels (3-pin connections; up to 8W power each). Overall, the approach is slick. Data for all channels are shown simultaneously, though CPU data more prominently. Among the many nice touches are the



ability to switch from Celsius to Fahrenheit readings, engaging the Lock function, backlight control, and an overheating alarm. Aerocool includes red and black bezels and extra fan cables, thermal probes, and stickers. Better, two USB 2.0 ports and mic and headphone jacks are integrated.

Antec Kühler Series

\$49.99 each | www.antec.com

Among Antec's cases, PSUs, and other gear is the Kühler series of high-performance CPU coolers, including box, flow, and shelf models all supporting current Intel and AMD sockets. The Kühler clan's big daddy is the box, a dual-tower, rotatable behemoth with eight copper heatpipes and one 120mm PWM fan (68.2cfm) seated between twin aluminum-finned towers. At 5.8 x 4.8 x 4.7 inches (HxWxD), the box begs that you check and recheck your motherboard layout and for chassis clearance before buying



to ascertain if it's a suitable replacement part. Like the box, the flow is a vertical cooler and sports a 120mm PWM fan but cuts roughly 1.2 inches off the box's depth and has one fewer heatpipe. The shelf, meanwhile, also integrates seven copper heatpipes but places its 120mm PWM fan at top to shoot air down over the cooler's aluminum heatsink and surrounding motherboard area. All three models include an installation kit complete with mini wrench for installation.

Arctic Cooling Freezer 13

\$35.90 | www.arctic-cooling.com

For budget-minded enthusiasts seeking strong performance for the dollars, the Freezer 13 could be a breath of cool air, depending on your view on using plastic push pins to secure mounting brackets. Able to handle up to 200W heat loads and donning a front-mounted 92mm PWM fan (36.4cfm; 600 to 2,000rpm), the Freezer 13 intertwines four U-shaped copper heatpipes with 45 aluminum fins. Appreciatively, the lower fins are slightly indented to add clearance space for nearby RAM sticks. Compatible with current Intel and AMD sockets, the Freezer 13's installation is a quick endeavor after removing the fan first.

As we went to press, Arctic Cooling informs us that a Freezer 13 Pro version with 300W cooling capacity is coming in February or March.

Cooler Master CM Storm SF-19 Strike Force USB 3.0

\$89.95 | www.cmstorm.com

The SF-19 Strike Force USB 3.0 notebook cooler is ahead of its time in that high-end, USB 3.0 port-bearing gaming laptops aren't exactly flooding the market yet. Still, this monster is something to behold for its four integrated



USB 3.0 ports and cold-forged polygon mesh surface above twin 140mm turbine fans drawing heat out the bottom. Thanks to a nifty modular design, the variably controlled fans (1,200 to 2,600rpm) are movable and swappable. Elsewhere, anti-slip rubber slots keep notebooks in place and double as a cool cable-management system. The cooler's seven-color LED implementation, meanwhile, includes a "breathing" effect that neatly accents the all-black frame, while a built-in handle will ease carrying this bad boy to LAN parties. The power cable and proprietary USB 3.0 cable are included.

Cooler Master V6GT

\$69.99 | www.coolermaster-usa.com

For gearheads, the V6GT's homage to muscle cars is right up your alley. Clean, streamlined, and intimidating, the V6GT puts a 50-plus aluminum fin array between twin 120mm fans. The fins are designed with a 5-degree tilt to lessen airflow resistance, and the fans take only seconds to remove. The clever "Double-V" design of the six 6mm copper heatpipes, meanwhile, lets airflow hit every pipe. Red, blue, and purple LED options are controlled via a button appropriately resembling an oil cap, and the DynaLoop Bearing fans, which house smoky, translucent S-blades, sport two power cables spliced into one 4-pin PWM connector you can separate if desired. At up to 38 dBA each, expect some noise at the top 2,200rpm speed (93.74cfm per fan). The universal mounting system, meanwhile, includes a nifty adjustable bracket for Intel sockets. Somehow, this big block of beauty still manages to provide nice motherboard clearance.



CoolIt Vantage A.L.C.

\$99.99 | www.coolitsystems.com

Been hesitant to get your feet wet in watercooling because of the associated

hassles? Meet the Vantage A.L.C., a self-contained, closed-loop system with propylene glycol/water mixture ready to go out of the box. AMD and Intel installations are a breeze, and the tool-less, adjustable retention bracket/screw approach for Intel sockets is wonderful. Elsewhere, a seven-blade 120mm PWM fan pushes air through the easy-mounting radiator and out the case. The real gem here, though, is the LCD on the pump that rests on the CPU assembly (pre-applied Pro A.T.C. thermal grease included). Beyond displaying fan speed (1,100 to 2,500rpm, automatically adjusted per operating mode), you can configure six display colors (with pulse option); four orientations; Celsius or Fahrenheit coolant temp readings; and Performance, Quiet, or Extreme modes via two built-in buttons. Further, an embedded wireless module enables configuration via CoolIt's Maestro (\$89.99) software interface. Quiet, smart (visual and audio alarms), and capable, the Vantage is also fairly priced.



Corsair Air Series A70

\$47.99 | www.corsair.com

Forget any notions that Corsair is but a memory maker. Corsair now offers builders several key components needed to construct high-end rigs, including cooling gear. Case in point is the A70, a stately, wide-bodied, dual 120mm intake-exhaust CPU cooler for Intel and AMD owners. Most noteworthy are the four 8mm U-shaped heatpipes threading through 45 aluminum fins and integrating directly into the aluminum plate for direct CPU contact, an approach that provides better heat transfer, Corsair claims. The fans spin at 2,000rpm (61.2cfm) by default but ratchet down to 1,600rpm (50.35cfm) via included resistor cables to lower noise from a rated 31.2 dBA to 26 dBA. A snap to remove and attach, the fans also sport rubber pads and studs to



cut noise. Another nice touch is the easy-to-engage lever-based bracket for AMD sockets and H-clamp approach for Intel installations. Corsair states 1.69-inch clearance from motherboards but coincidentally also cites potential issues for boards with 6GB or 12GB installations of its own Dominator and Dominator GT sticks.

Corsair Hydro Series H70

\$103.99 | www.corsair.com

Like CoolIt's Vantage A.L.C., the H70 is a no-fuss, self-contained watercooling option that builds upon Corsair's well-regarded H50 with numerous improvements, including doubling the H50's radiator to roughly 50mm and adding a second 120mm fan to the equation. In its testing, Corsair found that an overclocked (3.8GHz) Core i7-920 ran at 71.7 C, over a 13-degree improvement over Corsair's H50. Compatible with prevailing AMD and Intel sockets, installation is a bit more involved than the Vantage's but is still pleasantly straightforward. Corsair pre-applies thermal paste, for example, while retaining essentially the H50's same bracket-backplate approach. Fans move at either 2,000rpm (61cfm; 31.5 dBA) or 1,600rpm (50cfm; 26 dBA) using the included resistor cables. One note concerning fans: Corsair suggests using them in push-pull setup to draw cool air in from outside the case, thus ensuring "the delta between the air temperature and temperature of the radiator is maximized." Highly regarded for its cooling prowess, the all-black H70 goes light on motherboards weight-wise but heavy on ability.



Danger Den DD-GTX580

\$134.95 (satin), \$146.95 (black chrome top)
www.dangerden.com

We're assuming by now some of you have emptied your wallets to get your gaming mitts on Nvidia's GTX 580, the company's first fully powered Fermi



offering and DirectX 11 powerhouse. If so, Danger Den has already released two versions of the DD-GTX580 waterblock; both rely on a copper base, and you can choose between a black chrome or satin top based on your personal taste. (A DD-GTX580 waterblock with a black top and nickel base is upcoming.) Danger Den claims it worked closely with Nvidia to develop the single-slot solution and cites compatibility with all GTX 580 reference cards. Danger Den also cites 30 to 50 C better cooling vs. stock and states the block cools the GPU, RAM, I/O chip, and VRM. In a related note, if you're contemplating using an existing DD-GTX480 waterblock with your new GTX 580, don't; you'll risk damaging the card due to RAM location and elevation differences, Danger Den states.

Gelid Rev. 2 Icy Vision

\$54.99 | www.gelidsolutions.com



As a somewhat new entity in the cooling arena, Gelid probably isn't the first company you think of when the topic turns to heat. If it keeps turning out goods like the Icy Vision, however, that could change. Compatible with the GTX 580, GTX 480, Radeon HD 6850, HD 6870, and numerous other cards (reference board layouts only, however), the Icy Vision snakes five copper heatpipes through 85 0.4mm aluminum fins divided into two arrays. Above each array is a 92mm, 12V fan (67.14cfm; 2,000rpm) with blue, S-shaped blades that Gelid states generate 20% more airflow vs. standard units. The pipes all converge on a copper heatsink, to which they're soldered. Once mounted on a card, the result is a thick proposition that offers good clearance above a card but will likely exhaust three slots depending on the board. Compared to the hot-running GeForce GTX 480's stock cooler, the Icy Vision runs 27 C cooler at full

load and 19 C cooler overclocked at full load (801MHz GPU/974.5MHz Memory/1602MHz shaders). The package is generous with RAM and VRM heatsinks; thermal compound and tape; and more.

Scythe Rasetsu CPU Cooler

\$55 | www.scythe.com

With the Rasetsu, Scythe puts a top-flow spin on its previous and well-respected Yasya tower cooler. With the company's Slip Stream 120mm PWM fan situated on the top, midtower case owners are getting a cooler that provides good clearance in tight spaces and that also directs airflow downward over the CPU and surrounding area. The fan also comes complete with knob-based adjuster for variable 470 to 1,340rpm or 740 to 1,900rpm control. Compatible with Intel's and AMD's current sockets (along with some legacy sockets), the cooler offers an appreciated tool-less installation, though we're talking push pin usage for Intel installations and a clamp-down approach for AMD. Most notable here is Scythe's attractive and functional fork-like TMLF (Trident Multi Layer Fin) array, which aims to reduce static pressure and let more airflow pass through the fins. Threaded through the fins, you'll find six 6mm copper heatpipes in a twisting layout.



Silverstone Air Penetrator AP121-L

\$19.99 | www.silverstonetek.com

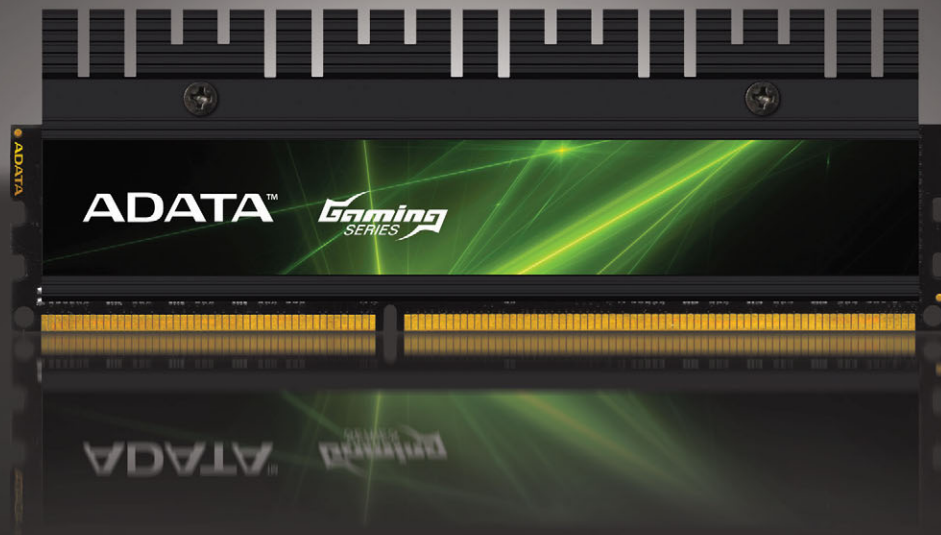
From afar, the 120mm Air Penetrator looks like most case fans. Inch closer and you will notice the seven



thick, wide, and overlapping fan blades behind a silver-tinged grille are anything but the norm. Neither is the fan's expressed purpose, which is to channel air in a tight column vs. spreading it about in a non-directional manner. Overall, the approach makes the fan ideal for sucking in cool air and targeting it at

ADATA XPG Gaming V2.0 Series DRAM Module

Fast & Stable



Within hardcore gaming, overclocking, and enthusiast circles, faster is always better. Unfortunately, though, faster tends to go hand in hand with hotter, which is not so good. ADATA's XPG Gaming V2.0 Series DRAM Module brings killer speed and related performance to component-conscious gamers in DDR3-1600, DDR3-2000, DDR3-2200, and DDR3-2400MHz frequency options. The company's approach of doubling up on the amount of copper it uses in the module's PCB, combined with the use of ADATA's TCT (Thermal Conductive Technology), brings gamers the stability and reliability needed to keep that speed from killing the gaming experience.

Thermally Speaking

Available in dual-channel (2GB x 2 and 4GB x 2) and triple-channel (2GB x 3 and 4GB x 3) kits, the XPG Gaming V2.0 Series DRAM Module's use of TCT means that each memory chip is put in direct contact with the module's aluminum heat spreaders. Further, the heat spreaders sport an extended surface area that leads to more efficient offloading of heat. The end result is that heat is immediately ushered away from those critical module areas where damage is likely to occur.

One aspect of TCT is ADATA's use of 2 ounces of high-quality copper in eight layers on the module's PCB, which gives the XPG Gaming V2.0 Series DRAM serious cooling capabilities and reduces electrical flow resistance to cut down on electrical waste. Overall, you're getting a module that offers better signal integrity and a longer lifespan.

Xtreme Plus Gaming

Optimized for 64-bit operating systems and sold with a limited lifetime warranty, the XPG Gaming V2.0 Series DRAM Module series includes the DDR3-2400G, DDR3-2200G, DDR3-2000G, and DDR3-1600G models, all of which are tested at latency settings of CL9-9-9-24 at 1.55V to 1.75V. Additionally, all are backward-compatible with DDR3-1600, DDR3-1333, and DDR3-1066 frequencies.

If you're a gaming enthusiast who requires the most out of your system components, the XPG Gaming V2.0 Series DRAM Module gives you the speed and performance you demand from system memory without sacrificing stability and reliability to get it. ■

specific components (say, your graphics cards) at up to 1-meter rated distances. Sporting a snazzy black braided cord; bundling 5V and 7V speed-reduction cable hookups; and available in blue, red, green, and white LED options (all look great when combined with the fan's silver frame), the Air Penetrator is heavy but solidly built. With a fixed 1,500rpm rate, the fan is also quiet (22.4 dBA).

ThermaPak HeatShift Laptop Cooler 17"

\$34.99 | thermapak.com

ThermaPak makes some significant claims concerning its HeatShift, a notebook cooling pad that uses a PCM (phase change material) approach that essentially amounts to sodium sulfate decahydrate inside a very comfy pad absorbing notebook heat. Beyond cooling a notebook by up to 11 F, ThermaPak claims the HeatShift also lengthens battery and overall laptop life, cools faster than USB-based fan coolers (it's obviously quieter, as well), requires no maintenance or refrigeration on your end, and optimizes airflow via the pad's grooved channels. With a laptop seated on top, the pad's crystals turn from their original solid state to a gel-like liquid (something you readily feel) as heat increases. Further, the pad uses convection principles to draw heat away without transferring it to your lap. Remove the notebook, and the crystals return to their solid form. For storage, the HeatShift folds up easily and only weighs about 24 ounces.



ThermalTake Jing

\$69.99 | www.thermaltakeusa.com

For the unaware, "jing" represents "silence" in Chinese, and silence is what this universal cooler was specifically developed to offer, as the open fan design suggests. To that end, at the minimum

800rpm speed, the cooler's dual 120mm tower fans (arranged in an intake-exhaust design) operate at 16 dBA

each. Manual control via a black knob connected to each fan's relatively short cable (expect to open your case to alter speeds) lets you bump speeds to 1,300rpm (42cfm max). Removing the fans for installation is a quick snap-off task. Elsewhere, ThermalTake provides one backplate for both Intel and AMD installations, though you'll use different mounting bars for each. Five 6mm, U-shaped heatpipes snake through the Jing's 41 aluminum fins, which are nicely staggered to allow airflow to hit them all at once. Beyond the express goal of quiet performance, the other main talking point here is the Jing's offbeat lime-green and gray motif, which we appreciate but will understand if you don't.



ThermalTake Massive23 LX

\$29.99 | www.thermaltakeusa.com



Whereas Cooler Master uses two fans in its CM Storm SF-19 Strike Force, ThermalTake relies on one gigantic 23cm blue-LED monster (54.6cfm; 17 dBA) for the aptly dubbed Massive23 LX. Serving 10- to 17-inch notebooks, the Massive23 LX draws power entirely from a notebook's USB port. (Thus, you'll lose one of the two included USB 2.0 ports straight away.) Construction-wise, hard, black plastic surrounds aluminum mesh grilles above and below the fan, which looks incredible when lit. Fan and LED on/off buttons rest above the USB ports on the left side, and an appreciated compartment

at back stores the USB cable when not in use. Elsewhere, the Massive23 LX slants slightly from back to front to promote better ergonomics, and carrying handles are on either side. We wish the antislip grips at top and bottom were a bit wider, but for less than \$30, call us nitpickers.

Zalman CNPS9900 Max

\$74.90 | www.zalman.com

"Top-notch" and "quiet" are two ways to characterize the coolers Zalman has turned out over the years. For the CNPS9900 Max, add "gorgeous." Suitable for current Intel and AMD sockets and available in blue or red LED versions, the CNPS9900 Max's architecture virtually demands a windowed case to show it off. Performance-wise, an 11-blade, 135mm PWM fan (900 to 1,500rpm in quiet mode using the included RC7P resistor cable and 900 to 1,700rpm in normal) sits between two sets of radially arranged fins. The copper fins and heatsink are coated with "black pearl" nickel plating, which Zalman professes provides long-term corrosion resistance. The thinner front intake fin array contains one heatpipe, while the thicker outtake array has two. Zalman uses "composite" heatpipe construction here, claiming 50% better heat transference vs. standard pipes. The construction uses an outer layer bearing axial grooves surrounding an inner sintered metal layer. Ultimately, this is a tall (152mm) but not terribly wide (131mm) cooler.



The Heat Is Off

Considering all the Sandy Bridge and Fusion goodness that's soon to come, keeping tabs on cooling hardware in 2011 should be a freezing good time. ■

BY BLAINE FLAMIG

Inside The World Of Betas

Calibre 0.7.31

Though the Amazon Kindle, Barnes & Noble Nook, and Apple iPad get all the press when it comes to e-readers, there are dozens of e-readers from lots of manufacturers. Many of these use ebook formats that someone thought was a good idea at the time, but as you prowled around the Internet looking for content, you find things that your reader just can't handle. This is where Calibre comes in.

At its most basic level, Calibre is an ebook converter, able to take HTML, PDF, TXT, EPUB, and several other formats and convert them into things your Kindle, Nook, Sony Reader, iPad, etc. can handle. It gives you page formatting options, table of contents options, and lots of nitty-gritty details that will make the most of your device's abilities. In some cases, you'll need to manually copy ebooks

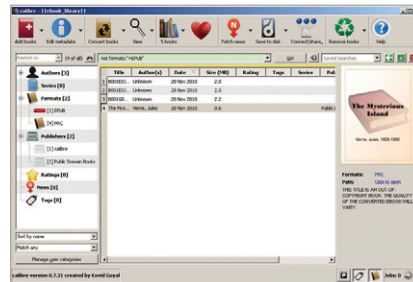
to your device, but Calibre can directly email or sync content to several devices, including the Kindle.

However, Calibre is also an RSS aggregator, so when you combine that with its formatting and conversion abilities, you get a pretty good way to get regularly updated content from Web sites onto your reader automatically. The current beta includes links and filters (collectively called "recipes") for a few hundred sources, including AnandTech, Engadget, *The New*

York Times, and lots more. Ambitious users can make their own, too, and then share them with the Calibre community. Calibre can also display ebooks within its own reader window.

Calibre makes use of a lot of different open-source libraries, so it looks a little bit like Frankenstein's monster. It's also terribly inefficient with memory utilization and takes quite a few seconds to load. However, the program is still very young, and there's really nothing else out there that competes. ■

BY WARREN ERNST



Calibre 0.7.31

Publisher and URL: Kovid Goyal, calibre-ebook.com

ETA: Q2 2011

Why You Should Care: There's no better ebook converter anywhere.

Scrivener For Microsoft Windows Beta 3

For a lot of writers, both amateur and professional, there's nothing worse than staring at a blank page, wondering how to start. Even worse, your writing tool (probably Microsoft Word) may be setting you up for a slow start, confounding you with pointless formatting options and screen views. Scrivener has been the secret weapon of professional writers and students for years, but only those writing on Macs. With the public release of a Windows beta, that's about to change.

Scrivener combines a lot of familiar elements into one program. It's part word processor, part outliner, and part file storage container. As is frequently common in software that comes from the Mac universe, it's also amazingly slick. Scrivener divides your project into one or more "documents," where a document is any chunk of text of any size. It might be a chapter for a novelist or a scene for

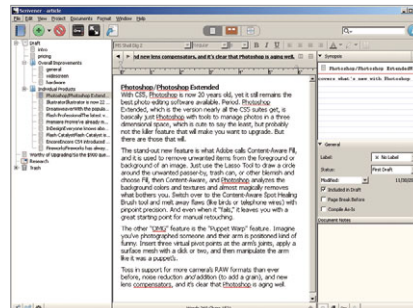
a playwright. Each document is a single item in Scrivener's outline structure, represented both by a virtual index card on a virtual corkboard as well as a line in the outline. Create, combine, expand, or collapse outline levels as necessary. Drag note cards around to reorganize the sections within the larger project.

Scrivener offers basic formatting options when creating documents, such as bold/italics/underline and basic

justification, but the real power comes when exporting your project to a PDF or RTF file; Scrivener includes lots of templates for screenplays, novels, comic books, and lots of other document types. In short, it worries about document formatting so you don't have to.

The beta may still be a little glitchy, but if you've ever struggled with a blank page, you won't care. You may even find your writing tasks become fun. ■

BY WARREN ERNST



Scrivener For Microsoft Windows Beta 3

Publisher and URL: Literature & Latte, www.literatureandlatte.com

ETA: Q2 2011

Why You Should Care: Don't let an empty word processor window keep you from writing.

Upgrades That'll Keep You Humming Along

Some serious players issue big updates this month, including a Flash Player beta that promises to improve Web video substantially. Google, Winamp, and Apple have introduced new tricks for some of their software, too.

Software Updates

Adobe Flash Player 10.2 Beta

A major release of the ubiquitous browser-based multimedia player promises vastly better performance by offloading video tasks to hardware accelerators. When supported by developers, the feature, called Stage Video, should allow higher frame rates and reduce CPU usage. This beta targets Internet Explorer 9 especially, with accelerated rendering support, as well. Flash Player 10.2 should also add fullscreen support for secondary monitors.

labs.adobe.com/technologies/flashplayer10

Flock 3.5.0

The "social browser" that hooks social networking more tightly in with your Web travels boasts a big performance upgrade, the company claims, and has plugged numerous security holes. Version 3.5 also fixes some stability issues from the 2010 3.0 release. The PC version moves from Chromium 6 to Chromium 7 for better performance. Flock 3.5 adds LinkedIn support, as well.

www.flock.com

Google Earth 6

Google's 3D view of our globe comes down to earth in this major update. The swoop down and tour view now has 3D trees to add realism to scenes. Best of all, the zoom-in views have been integrated with Google Maps' Street View, so users can put their feet on the ground and actually do a step-by-step walking tour of a given location. Finally, the

interface makes it easier to see and use historical images of a location (if available).

earth.google.com

Sandboxie 3.50

Sandboxie, which lets you run programs in an environment that won't make any permanent changes to your host machine, can now filter outgoing connections on SMB/CIFS ports with the Block Port setting. The program has also improved its compatibility with a number of security programs such as avast! Pro, AVG 2011, and CyberPatrol. Other fixes address errors when running with a recent Windows Update (KB981852), interference with other programs from the Drop Rights feature, and a connection problem with Windows Live Messenger 2011.

www.sandboxie.com

Siber Systems RoboForm 7 Beta (7.0.79)

Developer Siber Systems has been rolling out frequent builds as it readies a Version 7 launch of this venerable form filler and password vault. This latest update fixes crashes in Chrome and corrects slow performance and freezes in Firefox 4 beta 7. Recent updates added the ability to see logins and bookmarks together, a new menu structure, and an autosave function.

www.roboform.com

Total Commander 7.56

This file manager replacement for Windows enhances its right-click context menu for power users, now including a Run As Administrator option. The Lister and Compare By Content functions are

now able to autodetect and scan UTF-8 files according to their content. And when using the Go To File and Cancel functions, Total Commander will still retain the last search results for faster repeat searches.

www.ghisler.com

Winamp 5.6

The oldest of the great MP3 music players gets the latest in tech, as this version allows for wireless syncs to Winamp's new mobile app, Winamp for Android. This release also supports iTunes library importing. The podcast library has been replaced by a new system powered by Mediafly. Win7 users now will enjoy better integration from the player controls on Winamp's Taskbar Jump List.

www.winamp.com

Driver Bay Apple TV 4.1

If you have an iPad/iPhone/iPod touch and an Apple TV, then this is the upgrade for you. The new firmware works with the iOS 4.2.1 update to enable the AirPlay feature. Playback of downloaded videos and music tracks (from iTunes) to these mobile devices can be pushed to the Apple TV for viewing on the big screen.

www.apple.com/appletv

Razer Nostromo Firmware 1.01

Freaked out by the backlight of your new tricked out gaming keypad coming on even when it was switched off? A minor bug, to be sure, but Razer has issued an update to fix the eerie anomaly.

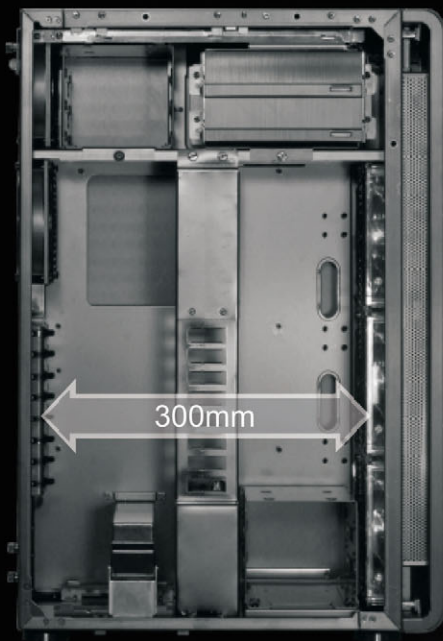
www.razersupport.com

BY STEVE SMITH



TYR SERIES

I came, I saw, I conquered



PC-X500FX SPECIFICATIONS:

Bay	5.25" x 2, 3.5" internal x 6, 2.5" internal x 1
Motherboard	ATX, Micro ATX
PCI	8 slot
Cooling Fan	140mm fan x 3, 120mm fan x 2
I/O Ports	USB 3.0 x 4, E-SATA x 1, HD Audio
Dimensions	243 x 606 x 415mm (W, H, D)
Color	all black

The Archivists

Apps To Rein In Your Media Library

When you deal with cutting-edge technology each day, the media world looks like it's turning into an all-digital landscape. E-readers such as the Kindle are slowly growing in popularity; CD sales are giving way to digital music downloads; and both DVDs and Blu-rays are experiencing fierce competition from Apple iTunes, Amazon.com Unbox, and Netflix.

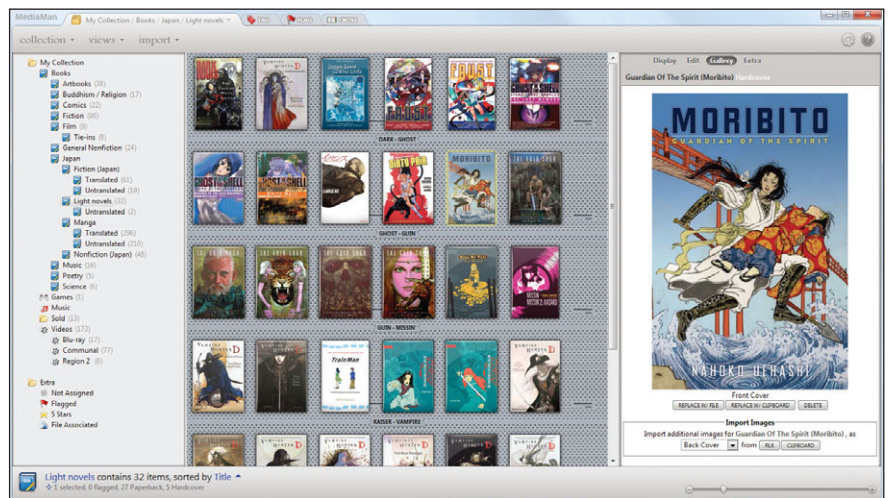
But there are still plenty of people with existing collections of physical media, as well as a need to organize those collections. What better way to do that than through a program that tracks everything in your collections, makes it possible to log items in to and out of your collection, and keeps tabs on what you'd like to add in the future?

For this review, we focused on desktop applications that manage real-world assets—books, movies, music, videogames, and so on. For each program, we looked at five key behaviors: importing collection information, searching collections, assigning and handling metadata, loaning items, and exporting or generating reports.

MediaMan 3.10

MediaMan was the first of the programs we tried out. Its shortcomings are heavily compensated for by the many things it does absolutely right. For one, it organizes a wide range of products—books, music, video, and software/games—and makes them manageable through a beautifully designed interface. It's not hard to get hooked on the program long before the 30-day trial period expires.

The fastest way to add items to a collection is by using a Web cam to scan barcodes, a tremendously handy method because many more people have a Web cam than they do a barcode scanner. MediaMan



matches the scanned code against Amazon's inventory; Google Books, the IMDb, and Amazon.com branches from outside the United States can also be used. Barcode scans are put into a queue for lookup, so you can scan a whole slew of items in one go without waiting for the machine to catch up with you. You can also search by typing a title, keyword, or ISBN, although that's inevitably slower.

We would've liked to see some way of looking up CD metadata on Discogs.com, too, because Amazon's music listings can be spotty. But I did like the program's full support for Unicode, which meant all the foreign-language titles in my collection—and we have a lot of them—registered properly.

MediaMan provides several meta-organizational tools. You can subdivide your collections into folders. You can then tag the items stored in those folders with various user-designated phrases ("rare," "first edition," etc.), or you can assign a status flag ("on

MediaMan 3.10

\$39.95

www.imediaman.com

loan," "lost," "damaged," etc.). An item can only have one status flag, but multiple tags—a behavior we found a bit confusing at first. Also, the only way to designate the loan status of an item is to use the status flag. We would have preferred loan status to be its own, completely independent item. On the plus side, you can add as many custom fields as you like to items (although searching by specific custom fields isn't as straightforward).

MediaMan can also reproduce its "virtual bookshelf" look in printed reports you can generate. Sadly, the report engine doesn't work as well as we had hoped: Reports take a very long time to build, even for only 100 items or so, and some attempts to render a report simply ended in a crash. On the plus side, exporting to various data formats (XML, CSV, and a

“virtual bookshelf” PNG image) was fast and reliable. Exporting an entire collection of 1,200 items took seconds.

As gorgeous as MediaMan is to look at, it's annoying that the menus don't follow any existing standard we've seen in any other application. You can't even fall back to the old standard of pressing ALT to show a full program menu, so you're forced to discover a lot of functions by either poking around the menus or simply reading the manual.

Collectorz.com Music Collector

(Editor's Note: In addition to Music Collector, we also evaluated two of Collectorz.com's other applications, Movie Collector and Book Collector.)

Collectorz.com is a whole ecosystem of products for cataloging various kinds of media—books, movies, CDs, comics, videogames, you name it. The ecosystem includes not only the application but also user-generated databases on the Collectorz.com site, various mobile apps, and a slew of other things.

The best way to get a feel for the Collectorz.com approach is to download one of its PC-based apps and give that a spin. The trial versions have a limit of 100 items in their library—more than enough for a test drive. The bad news is that, as with Readerware, you pay separately for everything: The book management app is sold separately from the movie management app, and so on. (We looked at the book, movie, and music apps.) If you collect more than one kind of media, this can become expensive quickly. On the plus side, it means each application is optimized for

the type of media in question. For example, the comic book collector has specific organizational options for comics that you wouldn't need with books.

Collectorz apps let you add items a number of ways: manual data entry, typing a barcode, scanning a barcode, or inserting and reading the media (e.g., CDs). CDs bring up full track information, not just title and artist. You can also import a raw list of titles and authors from a CSV file, or even a list of ISBNs, which can then be converted into full book descriptions. The apps also support barcode scanning with a dedicated barcode scanner (some of which Collectorz.com itself sells), but they don't support scanning with a camera. If you want to loan out a title to someone, it's as easy as a single click, and you can even bring up a report of the entire loan history of a given item.

The program handles a wealth of different kinds of metadata, such as tag clouds. You can fill in two user-defined fields per item and also supply choices from up to two user-defined lists, but you can't add user-defined fields. For metadata not supplied by Amazon, Collectorz.com uses its own homegrown, user-contributed database. The maintainers also periodically add data from third-party databases such as Discogs.com, and Collectorz.com's software even found some of the more obscure and rare CDs in our collection.

Discouragingly—and this is a major drawback—the program doesn't support Unicode, so CDs with non-English metadata (such as Japanese imports, for example) don't show up correctly. Also, garnering results from Amazon when performing title/author searches can be slower compared to the other programs because it

also attempts partial matches. (Search by ISBN for the fastest results.)

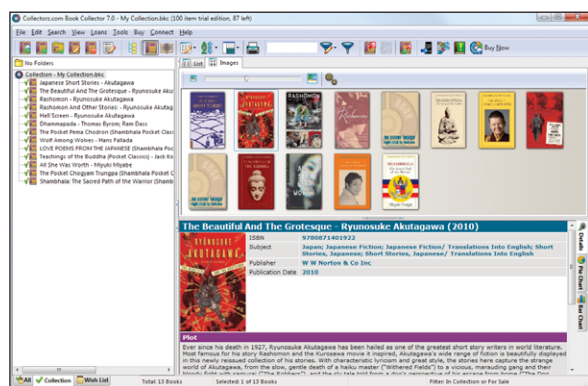
Another major Collectorz offering is the Collector Connect service (\$19.95 per year), which lets you upload and share your collection with others or automatically make it available on mobile devices—a handy feature for folks who want to take their lists with them when shopping. The pro versions of the Collectorz.com applications sport a slew of other features: batch add and batch modify functions, more advanced filtering and querying language, more user-defined fields, and more advanced export functionality.

Readerware 2.985

Like Collectorz.com's software, Readerware has different applications for different media (in this case, books, movies, and music). Readerware's applications are available for Windows, Linux, Mac, and even Palm OS, although for \$40 each (and a \$75 all-in-one bundle), we recommend you try the 30-day evaluation version first. Apart from the conventional desktop version, there's the previously mentioned Palm OS edition and a client/server edition (\$90), which supports multiple databases and concurrent access by multiple users.

We liked the wide variety of data import methods for Readerware. One really powerful feature is the ability to bulk import past purchases directly from your Amazon.com ordering history. It's far from perfect, though. It doesn't screen out preorders that haven't shipped yet or items purchased for others, so you may have to filter the results by hand.

Another, more common way to import items is to open a Web page for the item on a wide variety of sites, such as Amazon, Barnes & Noble, or Discogs.com, and drag and drop a link to the item directly into the program. Readerware then scrapes the page in question for release information. Bulk adding items from a plain-text list of ISBNs also works. Finally, there's support for barcode readers but not Web cams as a way to bulk-add items. The metadata added to titles is not as elaborate as other programs, and there's



Music Collector
\$29.95 (standard);
\$49.95 (pro)
Collectorz.com

Readerware 2.985
\$40 (\$75 for all programs)
www.readerware.com

no way to add custom fields short of a single "Comments" field per item.

The program's interface is admittedly unimpressive. It's extremely basic in an early Windows 95 application way and not very intuitive to navigate. The new 3.0 version, in beta as of this writing, has a slightly more attractive interface and is more performant, although its feature mix is about the same. Databases from the older version of the program need to be upgraded to a new format to be used in version 3, but the upgrade can be done non-destructively if you back up your data first.

A whole slew of built-in searches are automatically linked to hotkeys. For example, press CTRL-SHIFT-A, type the name of an artist, and press ENTER to see the results. One major goof when sorting, though: The Published Date field sorts by the alphanumeric value of the date field rather than the actual date. Marking titles as loaned out is pretty easy. Press CTRL-ALT-O, and all the loan information you need to provide shows up in a simple form. If you want to export your database, there's a whole slew of common data formats available—CSV, HTML, and UIIE (a format book dealers commonly use).

Code:Aero Technologies Book Label 2010

As the name implies, Book Label 2010 only deals with books. But at \$39.95, it's not priced very competitively. For the same price, MediaMan manages just about everything with a bar code.

Book Label 2010
\$39.95 (standard); \$49.95 (network)
Code:Aero Technologies
www.codeaero.com/book-label

Author	Title	ISBN	Format	First	Signed	Publisher	Published date	Place	Copies
Elman, Richard	Two Omars	0-552-02813-0	Paperback	No	No	Barham Crosshedge Dell			1
Rush, John	Princess	0000-0-2614-	Music Sheet	No	No	Pan	1967		1
Robert, Leon M.	Tarkenton Blues	00000000206	Hardcover	No	No	Twelve Publishers	1967		1
Hawkins, Susan	Amo a Cat	0-8048-1821-2	Paperback	No	No	Tuttle Pub	1972		1
Seaton, George	Beth	0-15-113923-6	Hardcover	No	No	Harcourt Brace Jovanov	1975		1
Seaton, Thomas	Neighbors: A novel	0-440-00556-0	Hardcover	No	No	Delacorte Press/Plenum	1989		1
Cassidy, A. C.	The alchemist: Computer connect w/	0-671-46363-2	Paperback	No	No	Position Press	1884		1
Seaborn, Niall	Hotel Harbor View	0-520279-40-0	Paperback	No	No	VIZ Media LLC	1980		1
Harrison, Scott	Hemistoma: History of the times of	0-222-72051-8	Paperback	No	No	University of Texas Pr	1991		1
Yell, Lita	Contra	0-360811-0-1	Paperback	No	No	University of California	1988		1
Diamond, Janet M.	Quin, Germa, and Sheen: The Fabu	0-202-31755-2	Paperback	No	No	W. W. Norton & Comp	April 1, 1999		1
Takamachi, Christine	Spacowack: Records	1-932724-05-5	Hardcover	No	No	Vertical	April 1, 2004		1
Evans, Richard J.	Lyns About Hitler: Hitler: Holocaust	0-405-02153-0	Paperback	No	No	Basic Books	April 16, 2002		1
Cassidy, Jim	Let it Blurt: The Life and Times of L	0-7678-5009-1	Paperback	No	No	Broadway	April 18, 2000		1
Hawkins, Yvonne	The Scarlet Gown of Aulaville	0-520-24192-7	Paperback	No	No	University of California	April 18, 2005		1

Adding books to the collection seems to be a strictly manual process. When you press CTRL-SHIFT-N to add a new item, you're presented with a keyword search form that polls Amazon.com, Barnes & Noble, or Google Books (your choice). We liked how this search form is optimized for rapid entry, though: You can type one search term, click to add it to a download queue, and then immediately start typing another term. We were able to add dozens of books in quick succession this way. Sadly, there's no native support for using a barcode scanner or Web cam. There's also no apparent way to bulk-import a list of books from another source.

Book Label's look and feel is in the mold of Microsoft Office 2007, including a ribbon interface. Common searches (title, author, ISBN, etc.) are accessible in a panel on the left side of the window, or you can just type in the generic search box at the top of the book list. This interface isn't always well implemented. The Quickfilter bar, for instance, has a fixed width, so you usually

have to resize the window to see the whole thing if the window's not maximized.

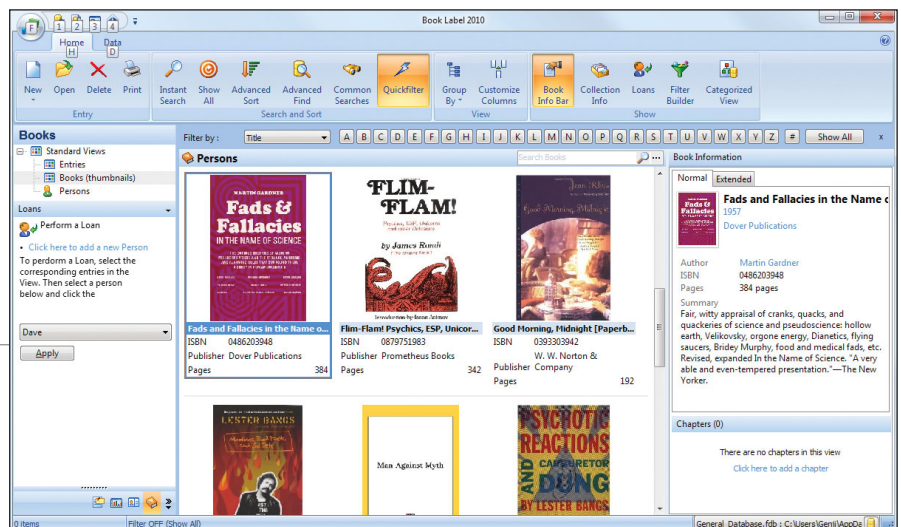
The mechanism for loaning books isn't terribly intuitive. You have to create an entry for a person to loan the book to, then assign the loan by selecting a name from a drop-down menu in the Loans pane on the left-hand side of the screen. What's wrong with right-clicking a book and selecting Loan? The export options are decent enough (they include HTML for a graphical "shelf" view and plain text with fixed-width columns), but the exported data is always a direct copy of whatever's in the current view. Metadata handling is pretty good (you can even define chapters for a given book) but there isn't really a way to add custom data fields.

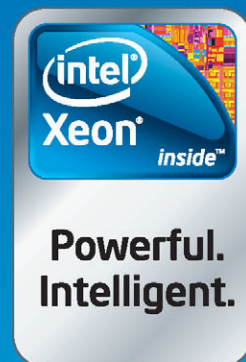
Check out the 14-day evaluation version if you want, but we think you can get a lot more for the same money elsewhere.

Final Thoughts

No one program covered all the territory flawlessly. We liked Collectorz.com's cross integration with its Web services and mobile device applications, but the pricing structure and the lack of proper multilingual support were disappointing. Readerware also forced you to buy multiple programs for different media, and its interface was rather bland. Of all the apps here, MediaMan came the closest to being a one-size-fits-all solution, both in terms of features and value. ■

BY SERDAR YEGULALP





Trade In Your Old Computer & Save

Get Paid To Better Your Business With Eurocom

IS IT TIME FOR YOU TO BRING YOUR COMPANY'S COMPUTERS UP TO SPEED?

Send Eurocom your working laptops, servers, and/or desktop computers (with monitors) and get up to 20% off new Eurocom notebooks or portable LCD PCs.* The company's Trade In Program is open to any brand. And if you currently own Eurocom systems, you can get up to 30% off new models via the Trade Up Program.

Think about that; not only will you save on IT equipment disposal fees for getting rid of your old PCs and monitors, but you'll also realize signifi-

cant discounts on top technology. We're talking about systems powered by Intel's Core i7 processor family, ATI and NVIDIA graphics, and more.

Eurocom builds systems not just for power and reliability, but also for easy upgrading. Thanks to modular designs that make parts upgrades easy, Eurocom's notebooks and other systems are capable of longer life spans than less future-proof models from its competitors.

Of course, you don't have to be a business owner to get in on this deal. It's open to individual users, educators, government agencies, the healthcare industry . . . you name it.

** Some restrictions apply.*

Featured Product: X7200 Panther 2.0

Available with a 17.3" Full HD 1920x1080 backlit LED display, powered by Intel® Core™ i7-980X Extreme Edition and Intel® Xeon® 5600 series processor; 6 core . Supports the following NVIDIA® and ATI® VGA cards: GeForce® GTX 485M with SLI®, Quadro FX 2800M, 3800M and 5000M , and Radeon™ Mobility HD 6970M with CrossFireX™.



EUROCOM®

upgrade@eurocom.com | call John at 1-877-EUROCOM x 238 | www.eurocom.com

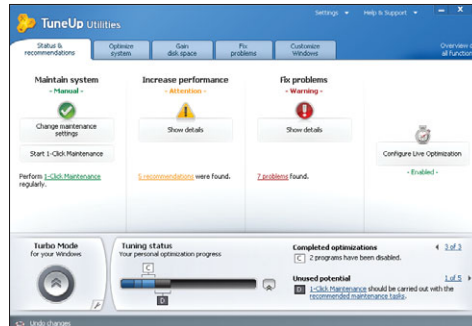
EUROCOM, EUROCOM logo are trademarks of Eurocom Corporation. Intel, the Intel Logo, Intel Inside, Intel Core, Core Inside, Xeon, and Xeon Inside are trademarks of Intel Corporation in the U.S. and other countries. NVIDIA, SLI, GeForce and Quadro are trademarks and/or registered trademarks of NVIDIA Corporation in the U.S. and other countries. AMD, ATI, CrossFireX, Radeon, and combinations thereof are trademarks of Advanced Micro Devices, Inc.

TuneUp Utilities 2011

In recent years, “Swiss Army knife” collections of hard drive utilities have regained the popularity they had in the very early days of the PC. Among the more interesting of these is TuneUp Utilities.

TuneUp Utilities includes many standard modules you’d expect to find: system information, hard disk error checking, disk and Registry defragmentation, etc. There are also some uncommon tools in the lot. A Turbo Mode lets you switch off unnecessary background tasks while performing a RAM-intensive task in the foreground. (A very effective wizard helps select those background tasks for you.) Accelerate System Startup and Shutdown recommends which programs slow startup and shutdown; it then disables those you’ve selected.

The most interesting new feature in TuneUp Utilities 2011 is Program Deactivator. It displays the executables consuming the most RAM, rates the importance of each



(along with a bar graph showing the effect on memory), and lets you selectively halt (and restart) them. The nearest analog is System Mechanic’s Process Manager, but that displays all active processes in no particular order and won’t let you restart programs you’ve halted.

We like Program Deactivator, but it has yet to reach its full potential. It doesn’t state the executable or drive location of a program as System Mechanic does, only its

TuneUp Utilities 2011

\$49.95

TuneUp

www.tune-up.com

name—imprecisely at times. For example, it told us that RealPlayer was running and could be disabled to save RAM, but “RealPlayer” was actually RealPlayer Scheduler. We also think two separate utilities, “Disable Startup Programs” and “Disable Programs” (Program Deactivator) could be effectively merged. The latter unloaded RealPlayer Scheduler from memory, but we had to run the former separately to prevent RealPlayer Scheduler from reloading itself every time we rebooted.

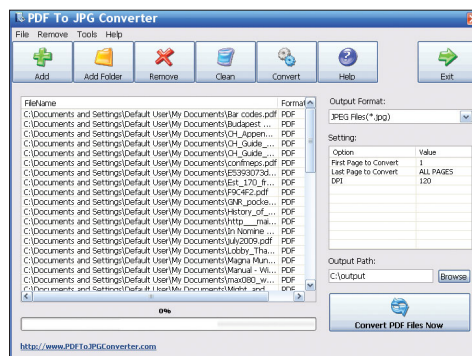
Still, TuneUp Utilities 2011 has much to offer. We definitely think it’s one of the better Swiss Army knife collections out there. ■

BY BARRY BRENESAL

PDF To JPG Converter

Anyone who’s accessed a large, graphics-heavy PDF knows one of the format’s worst drawbacks: load time. Depending upon a number of factors, you could be looking at one to several minutes spent waiting for the full file to display. When faced with such a chore, a utility that converts a huge PDF file into a series of small JPGs can be a considerable asset, hence PDF to JPG Converter.

Despite PDF to JPG’s narrow focus, it does have a few useful options. You can select a single page, all pages, or a range of PDF pages to convert. You can also change the output path, set the image DPI, and run batch conversions. PDF to JPG handles all of this transparently through a single interface that requires no in-product help system to figure out. That’s a good thing, too, because the Help menu brings up the Web site FAQ, which only provides a brief list of the software’s



capabilities, its system requirements, and the formats it supports.

We weren’t thrilled that PDF to JPG defaults automatically to My Computer when opened. It won’t store the last drive location you visited. We further found it redundant that we could only convert multiple files through the Add Folder button, instead of employing CTRL-Click on those same files under the Add button.

PDF to JPG Converter

\$49.95

www.pdf2jpgconverter.com

Batch conversion from multiple file folders isn’t supported, either. If you can allow for these quirks, though, PDF to JPG does its job well.

The program also lacks the versatility of its more comprehensive competitors, such as Office Convert’s All Office Converter Platinum, which converts PDFs to several other formats and can convert certain formats (such as DOC, XLS, JPG, BMP, etc.) to PDF. This comes at a cost of \$79.95, however, while PDF to JPG is currently selling for \$49.95. That said, if you can spare the additional change, Office Convert’s offering supplies that much more. ■

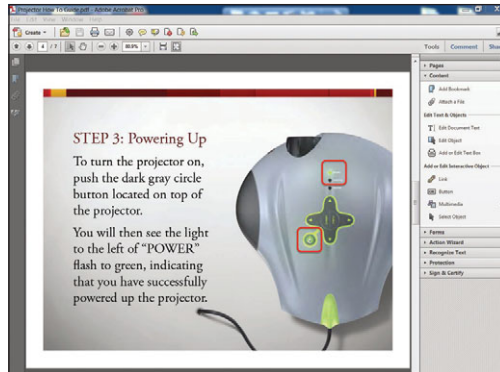
BY BARRY BRENESAL

Adobe Acrobat X Pro

In the beginning, Acrobat was a relatively simple application: It created PDF files. Period. Later, it displayed PDF files in browsers, and even included some rudimentary form-creation capabilities. Subsequent versions added more functionality, but for years, Adobe Acrobat didn't do a whole lot more than create various forms of PDF files given input from other applications.

Somewhere along the way, though, Acrobat grew up. The current incarnation, Acrobat X Pro, is essentially a full-featured DTP app that allows you to create and publish sophisticated interactive presentations that contain . . . well, PDFs, of course, but also just about any other file type: Flash, Word, Excel, and many others. (Acrobat X Pro can also faithfully convert most of those formats in both directions.)

Adobe calls these presentations Portfolios, a term that's especially apt given the



fact that they can include any number of separate mini presentations consisting of almost any form of content. Using Portfolio wizards aimed at knowledge workers rather than media specialists, just about anyone can create sophisticated interactions that include not just static images but also multimedia, Web content, and dynamic forms that can be filled out and submitted within Acrobat.

Acrobat X Pro

\$199 (upgrade), \$449 (full)

Adobe

www.adobe.com

Creating portfolios or sections of folios can involve many steps, so Adobe has provided a macro-like tool that can record and group these steps into Actions. Actions can be enhanced, modified, and shared, even if the content resides at remote, discrete locations.

Adobe Acrobat X Pro is a much more complex—and useful—application than earlier versions. Formerly limited to creating typographically accurate and attractive versions of various file formats (no small feat at the time, mind you), Acrobat has evolved to make creating and sharing sophisticated, dynamic content simpler than ever. ■

BY ROD SCHER

Sony Vegas Pro 10

Let's just get it out of the way, OK? Sony's Vegas Pro 10 is expensive. And sophisticated enough to occasionally be confusing. After all, we're talking here about a professional-level non-linear editing suite, with all the power needed to produce professional-quality content, much like Apple's Final Cut Studio. It's a power tool, and power tools can cost big bucks and take awhile to figure out.

But you can do it, and it's worth doing—because Vegas Pro 10 is magic. It does *everything*, including automatically detect and repair unsynchronized audio and video, allow you to nest projects, and add closed captioning to projects—and then export those captions to other formats, including MOV, WMV, YouTube, and more.

You've used consumer-grade video-editing suites, and they are very impressive. Vegas Pro 10 works much like those, with a drag-and-drop project



timeline, editing controls, etc. But then it starts adding features that only a pro (or a truly dedicated amateur) would appreciate: real-time audio effects, over 190 customizable video effects and 175 transitions, advanced video compositing, multicamera editing, image stabilization, print-to-tape, and others. Perhaps most telling of all, Vegas Pro 10 now supports Broadcast Wave Format, AVCHD timecode, and CineForm Neo3D.

Vegas Pro 10

\$599.95 (Download)

Sony Creative Software

www.sonycreativesoftware.com

Vegas Pro 10 is powerful and therefore complicated. But you're not on your own; Sony Creative did a good job of providing solid help files, including those context-sensitive "What's This?" mouse-pointer-driven help prompts we used to know and love in earlier Windows apps. In addition, there are extensive interactive tutorials that cover just about every Vegas Pro 10 function, from the basics to complete project how-tos.

If you've outgrown editing suites aimed at consumers and are looking for professional-level tools to create audio and video, Sony Vegas Pro should be on your short list. ■

BY ROD SCHER

Google App Inventor Beta

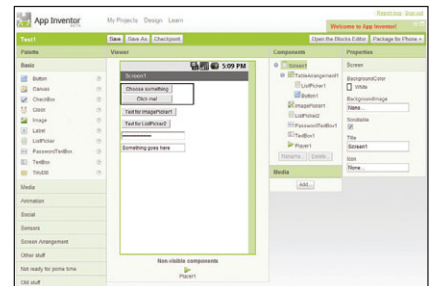
Want to build Android apps the easy way? Google App Inventor lets budding programmers develop apps with nothing more than an Android phone and their PCs, but it's rather cumbersome to work with and very self-contained.

App Inventor runs from Google's own servers, so it runs in a Web browser. You have to also download and install software on the PC to allow App Inventor to communicate with your phone. This is the clunkiest part, because you have to constantly switch between the PC-side software, which lets you develop the internal program logic, and the browser-side app builder (which lets you design the app interface). The phone also needs to have its debugging options turned on, but that's explained well in App Inventor's FAQ.

The interface editor lets you place buttons, images, and other visual elements. To make them do things, you use App

Inventor's own visual programming language, where "blocks" of code snap together like puzzle pieces and let you create things such as subroutines, functions, or on-event triggers. When you're done, you can then package and upload the results to your phone, which then runs like any other Android app.

That said, Inventor is riddled with limitations. You can't create a multiscreen app yet, for instance, nor can you export your project and work on it in an external IDE that supports Java. You can only export projects as a form of sharing with other developers in App Inventor. Veteran programmers used to typing code by hand might find the visual code editor frustrating. And there's currently no way to make your created apps available through the Android Market, although in the App Inventor FAQ, Google claims to be looking into ways to do that.



There's little question Android's growing popularity will create demand for easy-to-use development tools, but App Inventor needs a lot more polish to be broadly useful. Right now, it's more at the stage of an interesting idea than a real programming environment. ■

BY SERDAR YEGULALP

App Inventor Beta

Free

Google

appinventor.googlelabs.com

Digiarty Software WinX HD Video Converter Deluxe 3.10.1

WinX HD Video Converter Deluxe takes the vast majority of the pain out of converting video between common formats and devices. Even at that, this is still a pretty good achievement.

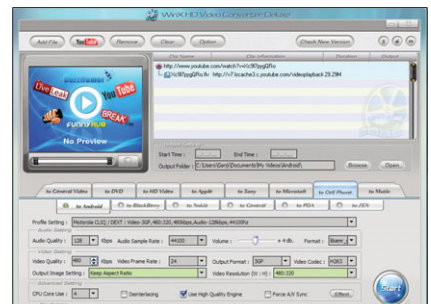
This program can read from and write to most every commonly used video file format, including the following: QuickTime, AVI, WMV, MP4, MPEG TS, and even YouTube's native video format. Drop in a file or point to an online movie hosted on YouTube (or many other sites), choose its start and end points, select the target device, pick a conversion profile if you need one (for a brand of cell phone, for example), optionally set bit rate and other compression parameters, and click Start.

The speed of conversion varies, but if you have a multicore PC, you can dedicate any number of cores to the process to speed

things up. WinX's High Quality Engine produces better-looking results but takes a longer time, although only incrementally longer on modern PCs. For example, I got a 70fps conversion rate on a three-minute 640 x 480 .MOV file, using four cores and high-quality mode, which compressed a 223MB MPEG file down to a 32MB H.264 file. Your own mileage will vary, but in every case, I got better-than-real-time (24 to 30fps) conversion speeds.

The program's smart enough to preserve things such as image aspect ratios, useful for those few videos that use non-square pixels (e.g., anamorphic widescreen). You can choose from multiple audio tracks in a file, and a recent update to the program supports subtitles from both DVDs and MKV files.

A few things are missing. The program doesn't upload the file to the



target device automatically; you have to do that yourself. Also, don't think you can use this app to convert copy-protected DVDs—the program reports an "unsupported format" or hangs if you feed it a protected DVD. ■

BY SERDAR YEGULALP

WinX HD Video Converter Deluxe 3.10.1

\$49.95

Digiarty Software

www.winxdvd.com/hd-video-converter-deluxe

GIGABYTE™



Coming soon...



G1-Killer™

Gaming Motherboards



Leader in Motherboard Innovation

www.gigabyte.us | ca.gigabyte.com

Will The Real Netbook Please Stand Up?

Chrome OS, The Chrome Web App Store & The Chrome OS Notebook

With Google's recent unveiling of Chrome OS, we finally get to see Big G's fully-realized take on Internet-based computing. Spoiler: It's a major evolutionary step toward the future.

Chrome OS

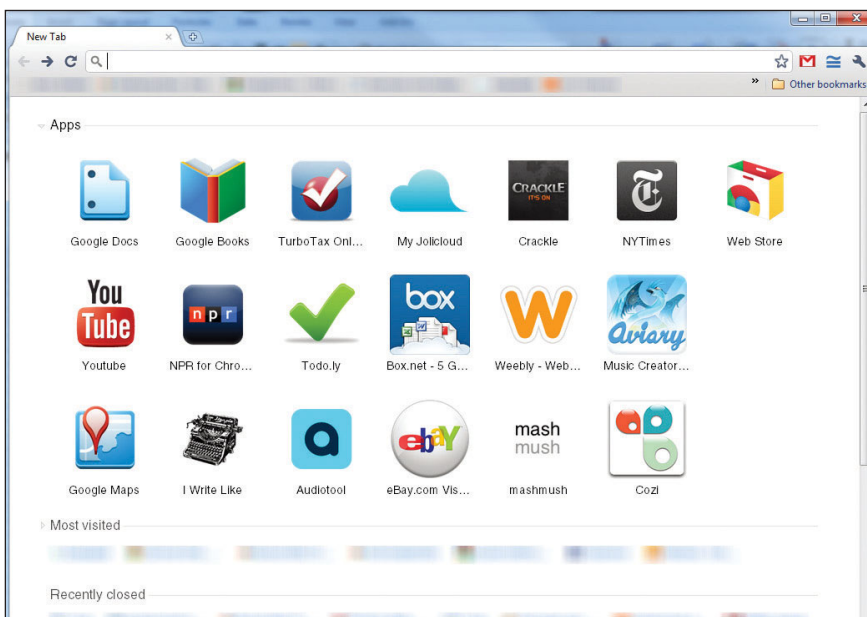
As expected, Chrome OS is basically just the Chrome Web browser, in terms of how you use the operating system. Everything you do through Chrome OS is done through the browser, although obviously there's more going on under the hood.

When you boot a Chrome OS-equipped machine, the OS runs Verified Boot, which automatically checks the system to make sure nothing is amiss, and it also automatically grabs all the latest updates, fixes, and enhancements to the OS that Google has pushed out. (The apps themselves, by dint of living in the cloud, are updated outside of the operating system.) Within seconds, you're up and running—Chrome OS automatically logs you in to all your Google services, too.

The home screen is a tiled list of all your Web apps. To get more Web apps, the Web App store is exactly one click away—more on that in a moment.

Security is an important feature of Chrome OS. Each tab runs as an independent process in its own sandbox, so if you accidentally happen upon a malicious site or experience a crashed page, your other instances are safe. You can simply kill the offending process and keep right on rolling.

To keep your accounts safe from other users, Chrome OS features a Guest Mode, where another party can use your Chrome OS machine without logging in, thereby circumventing any access to your apps and accounts. The OS will automatically



If you're familiar with the Chrome Web browser and the concept of an app store, you already know how to use Chrome OS.

erase the guest's browsing history upon completion, too, which is a nice touch.

And of course, because everything is online, your data will remain safe if your notebook is lost or stolen—assuming a thief can't hack your password—and if the computer is broken, you can just log in on a new machine without skipping a beat (well, maybe one or two beats) instead of trying to salvage everything from your hard drive.

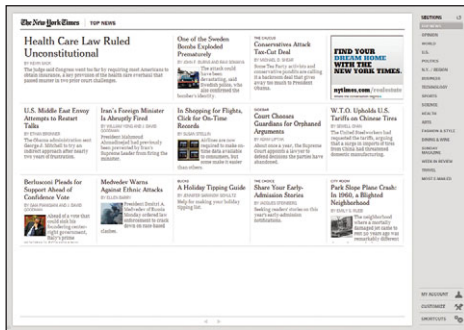
Of course, there's that pesky problem of needing to be connected to the Internet to use Chrome OS. Google is running a pilot program at the moment, and part of that arrangement is 100MB of free 3G service each month for two years from Verizon, with the option of purchasing unlimited access for \$9.99 per day, and an additional 1GB, 3GB, or 5GB of monthly data

(available for \$20, \$35, or \$50 per month, respectively), all with no contract. It will be interesting to see what connectivity options are available when Chrome OS rolls out on third-party hardware, but perhaps this is a harbinger of things to come—the “no contract” part, at least, is music to my ears.

The Chrome Web App Store

You can already get a taste of what Chrome OS will be like simply by using the Chrome Web browser. The Chrome Web App store is already tied to the browser, so you can dig into that, as well.

Your first interaction with the store may be underwhelming, as many of the apps are just elaborate bookmarks to your favorite sites. However, upon closer inspection, many of the apps in the Chrome Web



Apps in the Chrome Web App Store are often different than the corresponding Web site, such as the New York Times Web App (on the left) and the New York Times Web site (on the right).

the necessary lightweight operating system—for all intents and purposes, Chrome OS is just the Chrome browser, but with the

intelligence required to take care of the hardware, too.

With the app paradigm front and center, the proliferation of Web sites smartly optimized as apps, and the continued explosion of cloud-based tools and services, there is very little that you can't do online anymore. Web browsing, email, streaming audio and video, reading books and magazines, shopping, video chat, word processing, spreadsheets, presentations, file storage, photo and video editing, some gaming, Web site creation, music production, your taxes, investing, group collaboration, to-do list and calendar management, and on and on—how much is left that can only be done locally?

It's true that beefy, souped-up desktops, notebooks, and workstations aren't going anywhere for a while, and judging by the early Cr-48 models and what Chrome OS and the Chrome Web Store offer, there is a ways to go before the vast majority of us can even begin to consider relying solely on the Chrome ecosystem for our computing needs. Always-on connectivity is the 2,000-pound gorilla, and the hardware itself leaves something to be desired in terms of what you can connect to the machine. However, as the device makers provide their own takes on a Chrome OS notebook, this new paradigm is a compelling one, to say the least.

One factor that will likely play a huge role in Chrome OS adoption is the cost of the third-party notebooks that will be hitting the market in coming months. At the right price—say, around the range of yesteryear's slew of netbooks—it's incredibly compelling. ■

BY SETH COLANER

App Store are specifically designed as apps, similar to what you'd see on a tablet. For example, the *New York Times* Web app has much more in common with the newspaper's iPad app than with its Web site (www.nytimes.com).

Then again, that's sort of the point; Chrome OS isn't so much a whole new ecosystem as it is a reframing of what's already there for us to use on the Web, with some tweaks and enhancements. The *New York Times* Web app is a good example; other Web apps for certain sites and tools offer automatic log in and other perks. If you think of Chrome Web Apps as “portals to Web-based tools and services” as opposed to “fancy bookmarks,” the whole thing makes more sense.

The Chrome OS Notebook

The Chrome OS notebook itself has been a bit of a mystery. We had an inkling of what Chrome OS would be, but the hardware was a big question mark. Unfortunately, it still is to a certain degree.

To test the whole Chrome OS shebang, Google is issuing bland-looking, black matte notebooks dubbed “Cr-48” to 60,000 lucky ducks through a pilot program. The Cr-48s will not be available for purchase; rather, hardware partners including Samsung and Acer will reportedly come out with Chrome OS-branded notebooks of their own sometime in mid-2011. At that time, we'll get a better take on Chrome OS hardware. For now, the Cr-48 can tell us at least something.

The Cr-48 has a 12.1-inch screen, full-size chiclet-style keyboard, a large touchpad, and 16GB of flash storage courtesy of a SanDisk SSD. The processor

is an Intel Atom N455 (1.66GHz), and the machine is equipped with 2GB of Hynix DDR3 memory. The Cr-48 also boasts a built-in Webcam, 802.11n Wi-Fi, and 3G. Ports include VGA and slots for a 3G SIM card and SD card. The battery is purported to last for 8 hours of use with 8 days of standby time, and the whole notebook weighs less than 4 pounds.

On Adoption

The prospect of a notebook that runs one and only one operating system (no possibility of dual-booting, unfortunately), that updates itself, and is locked down to avoid tampering seems to fly in the face of the spirit of open source. However, at a time when it seems as though every big tech company is launching its own platform tied to its own proprietary app store, the fact that the Chrome OS Web store is populated by independent sites, applications, and services is a nice breath of fresh air.

The big question, of course, is whether Chrome OS (along with its associated hardware) is a game-changer. Is this the real netbook, the one everyone was trying to make?

The netbook craze hit hard and seems to have hit the canvas even harder; there's just too much that netbooks can't do. With their tiny screens, cramped keyboards, and the fact that far too many try to run Windows on inadequate hardware, the convenience and cost of a cheap, flyweight laptop just didn't provide enough incentive for many users in the long run.

The Chrome OS notebook, however, is different. It remains to be seen what sizes and specs the upcoming notebooks will offer, but Google has certainly provided

Windows®. Life without Walls™, CyberPower recommends Windows 7

Create the PC of your dreams

AMD
The future is fusion

Order Toll Free
800-707-0393



Techsupport

All Desktop systems come with
3 year Limited Warranty +
lifetime toll free techsupport



FREE
Liquid Cooling
on all systems



AMD Phenom™ II processors deliver maximum headroom, for The Ultimate Visual Experience™ for HD gaming and entertainment with the innovation to accelerate your performance.

www.cyberpowerpc.com

CyberPOWER Inc.

X6 HEX-CORE PROCESSOR AMD Phenom™ II 1090T CPU \$ 1229 (Black Edition) 1075T CPU \$ 1189 1055T CPU \$ 1175	X2 DUAL-CORE PROCESSOR AMD Athlon™ II 255 CPU \$ 1029		GAMER DRAGON 9000 Windows 7 Genuine Windows 7 Home Premium 64 Bit Edition		\$1029
X4 QUAD-CORE PROCESSOR AMD Phenom™ II 965 CPU \$ 1139 (Black Edition) 955 CPU \$ 1119 AMD Athlon™ II 645 CPU \$ 1085	12X Blu-ray Player + DVD RW 24X DVD-ROM AMD 7.1 600 W FREE Keyboard Optical Mouse Liquid Cooling		Asus® M4A87TD EVO AMD 870 USB 3.0 & SATA 3 Mainboard Corsair® 8GB DDR3-1333 Dual Channel Memory Kingston 30GB SSD(Boot) +1TB SATA III DATA HDD AMD Radeon™ HD6870 1GB Direct X 11 Video Card COOLERMASTER 690 II Advance Gaming Case 700 Watt Power Asetek Liquid Cooling System		

X6 HEX-CORE PROCESSOR AMD Phenom™ II 1090T CPU \$ 1005 (Black Edition) 1075T CPU \$ 965 1055T CPU \$ 949	X2 DUAL-CORE PROCESSOR AMD Athlon™ II 265 CPU \$ 828		GAMER DRAGON 8000 Windows 7 Genuine Windows 7 Home Premium 64 Bit Edition		\$828
X4 QUAD-CORE PROCESSOR AMD Phenom™ II 970 CPU \$ 939 (Black Edition) 965 CPU \$ 915 (Black Edition) 945 CPU \$ 769 AMD Athlon™ II 645 CPU \$ 859	12X Blu-ray Player + DVD RW 24X DVD-ROM AMD 7.1 600 W FREE Keyboard Optical Mouse Liquid Cooling		Asus® M4A87TD EVO AMD 870 USB 3.0 & SATA 3 Mainboard Corsair® 8GB DDR3-1333 Dual Channel Memory 1TB SATA-III 6.0 7200 RPM HD 32MB Cache AMD Radeon™ HD6850 1GB Direct X 11 Video Card Xion Predator 970 Tower Case w/ 600 Watt Power Asetek Liquid Cooling System		

X6 HEX-CORE PROCESSOR AMD Phenom™ II 1090T CPU \$ 785 (Black Edition) 1075T CPU \$ 759 1055T CPU \$ 709	X2 DUAL-CORE PROCESSOR AMD Athlon™ II 260 CPU \$ 559		GAMER ULTRA 7000 ELITE Windows 7 Genuine Windows 7 Home Premium 64 Bit Edition		\$559
X4 QUAD-CORE PROCESSOR AMD Phenom™ II 965 CPU \$ 665 (Black Edition) 945 CPU \$ 639 AMD Athlon™ II 645 CPU \$ 599	12X Blu-ray Player + DVD RW 24X DVD-ROM AMD 7.1 600 W FREE Keyboard Optical Mouse Liquid Cooling		Gigabyte® M4A-770T-USB3 AMD 770 USB3.0 Mainboard Corsair® 4GB DDR3-1333 Dual Channel Memory 1TB SATA-II 3.0 7200 RPM HD 16mb Cache ATI Radeon™ HD5450 1GB Direct X 11 Video Card CoolerMaster Elite 430 Mid-Tower Case 450 Watt Asetek Liquid Cooling System		

AMD, the AMD Arrow logo, AMD Phenom™ II, AMD Athlon™ II, ATI Radeon™ Graphics, 7200 Series, and combinations thereof are trademarks of Advanced Micro Devices, Inc. All prices are subject to change without notice or obligation. CyberPower is not responsible for any typographical and photographic errors. Copyright ©2008 CyberPower. All rights reserved. NVIDIA®, GeForce®, SLI™ are trademarks or registered trademarks of NVIDIA Corporation or its subsidiaries in the United States and other countries. CyberPower PCs use genuine Microsoft® Windows® • www.microsoft.com/go/windows7all

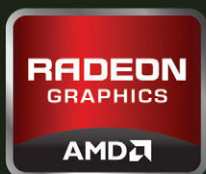
SAPPHIRE HD6970 Special Edition with Battlefield: Bad Company 2 Vietnam

SAPPHIRE HD 6970 Battlefield: Bad Company 2 Vietnam Special Edition



BATTLEFIELD BAD COMPANY 2 VIETNAM

Get Ready for a Whole New War. A journey back to the 60's with Battlefield: Bad Company 2: Vietnam and the SAPPHIRE HD6970 Special Edition. Featuring the new AMD RADEON HD6970 Dual Engine GPU with 2GB of GDDR5 memory, the SAPPHIRE HD6970 Special Edition is available in limited quantities and made for the Superior Enthusiast.



- Increase your field of vision with AMD Eyefinity technology.¹
- AMD EyeSpeed technology for stutter-free video playback.²
- See your characters in lifelike detail with DirectX[®] 11 technology.

Learn more at www.sapphiretech.com

AMD
The future is fusion

EA GIGABYTE

SAPPHIRE
www.sapphiretech.com

©2010 SAPPHIRE Technology LTD. All rights reserved. AMD, the AMD Arrow logo, Radeon and combinations thereof are trademarks of Advanced Micro Devices, Inc. Microsoft, Windows, and DirectX are registered trademarks of Microsoft Corporation in the U.S. and/or other jurisdictions.
Other names are for informational purposes only and may be trademarks of their respective owners. Additional hardware (e.g. Blu-ray drive, HD or 10-MHz monitor, TV tuner) and/or software (e.g. multimedia applications) are required for the full enablement of some features. Not all features may be supported on all components or systems — check with your component or system manufacturer for specific model capabilities and supported technologies.
¹ AMD Eyefinity technology works with games that support non-standard aspect ratios, which is required for panning across multiple displays. To enable more than two displays, additional panels with native DisplayPort™ connectors, and/or DisplayPort™ compliant active adapters to convert your monitor's native input to your cards DisplayPort™ or Mini-DisplayPort™ connectors, are required. AMD Eyefinity technology can support up to 6 displays using a single enabled AMD Radeon™ graphics card with Windows Vista or Windows 7 operating systems — the number of displays may vary by board design and you should confirm exact specifications with the applicable manufacturer before purchase.
² AMD EyeSpeed technology is a set of technologies designed to improve video quality and enhance application performance. Full enablement of some features requires support for AMD Accelerated Parallel Processing (APP) technology and/or AMD's Universal Video Decoder (UVD).

Where Jesters Are Kings

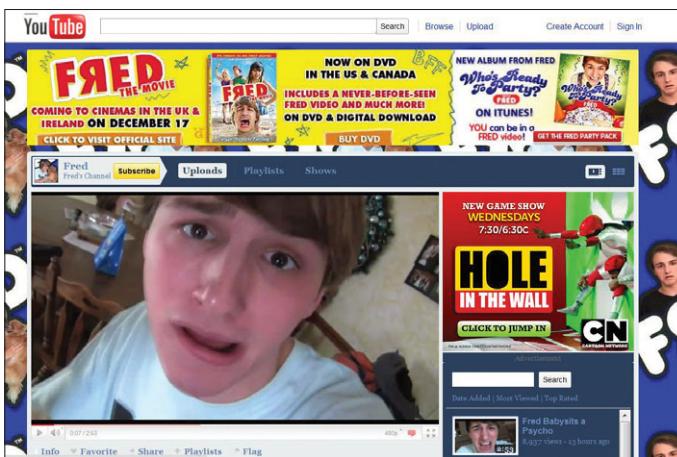
The Rise Of The Web Video Stars

In any given week, more people are watching “Smosh,” “Fred,” or “What the Buck?!” videos on YouTube than most cable TV networks.

According to online video metrics firm VisibleMeasures, the perennial adolescent and run-off-at-the-mouth “Fred” reaches over 35 million people with his deliberately annoying voice and arrested adolescent antics. Nickelodeon recently produced a full-length film with the character (created by Lucas Cruikshank). Comedy team Smosh and their purposefully amateurish send-ups of pop culture reach 18 million. Lisa “LisaNova” Donovan (160 million total YouTube views) offers video satires of Sarah Palin’s reality TV show, alternative “Titanic” endings, and a demented Mary Poppins screaming at her charges. Ray Williams of “Ray It Ain’t So” is currently one of the most popular series on YouTube. The wise-cracking review of Web video and other pop culture items has over 2.4 million subscribers.

Many TV executives would kill for these kinds of audiences. But most of these folks are no more than individuals who picked up a video camera, put on a show in their basement, and uploaded it to find an audience. In just a few years, the user-generated video phenomenon that YouTube helped fuel has generated its own short list of amateurs who have vaulted quickly into a special new kind of fame—Web stardom. They have millions of fans, some sponsors, and may be on the verge of becoming a big business.

If the top Web video stars sound and often act like class clowns who got their hands on a video camera, it’s because many of them pretty much are, and proudly so.



Lucas Cruikshank (aka “Fred”) is among the breakout stars who grew to fame on YouTube. Nickelodeon put him into his own full-length theatrical release film.

“It’s like being eight years old on the Internet,” says Caitlin Hill, who helped pioneer Web video stardom as “TheHill88” in 2007, when her send-ups of other viral video hits (such as lonelygirl15) caught fire. “They are being silly. They are the people who always had all the good one-liners.”

According to fast-talking Michael Buckley, host of the perennially popular “What the Buck?!” show, the silliness and often rude frankness of the top Web video celebrities is central to the form.

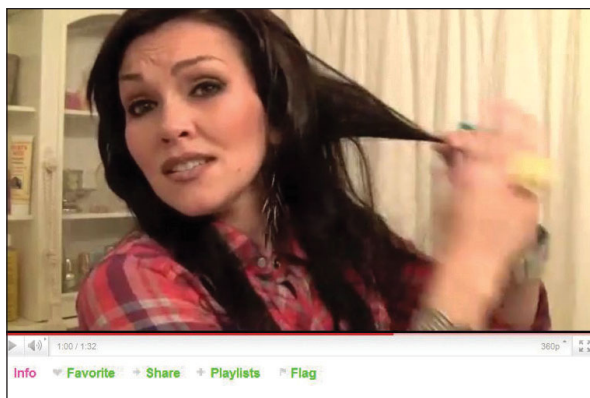
“They are saying what the audience is thinking but not saying,” he says. “I think in general the type of people who are popular have the comedic silliness that kids like. They want people who are a little edgier, with a little dark humor to them.” In other words, they get audiences larger than some TV shows by offering content most TV executives wouldn’t touch.

But not all Web video stardom comes from antic comedy. “I did my first video on cleaning up your hairbrushes,” says

Kandee Johnson, who now has over 400,000 subscribers to her YouTube channel, which demonstrates beauty techniques. “Two years ago, my friend said, ‘You should look at this girl who is doing tutorials for putting on make-up.’ I thought this was so silly.” Now, Johnson, a makeup artist to celebrities, barely does a regular gig.

“Once my numbers reached hundreds of thousands and the videos were featured on YouTube’s home page, I realized this is a full-time job. I spend the nights writing hundreds of emails answering people.”

Beauty tip vloggers like juicystar07 and MichellePhan have over 500,000 and 1 million subscribers, respectively. In fact, there is now a very active subgenre of makeup and beauty videos on the Web that major cosmetics and retail companies have recruited for product placement and sponsored clips. Johnson herself relies on revenue sharing on ads that Google/YouTube run on her channel page, “but a lot of other girls do sponsored video



Beauty tips and makeup tutorials have become one of the most popular video genres online, making stars of teachers such as Kandee Johnson.

that brokers deals between these amateur video makers and major brands (including FOX, CBS, MTV, and Microsoft).

"We give them the opportunity to be paid for what they want to do," she says.

As a fellow video star herself, Hill saw an opportunity to make the sponsored content model work better for both advertiser and online personality. "I already had seen [online video stars] screwed over by companies and then being called 'sellouts.'" Many of these amateurs were grabbing pocket change from fly-by-night marketers for in-show promotions that disrupted the trust and familiarity many audiences establish with these video makers. "It was T-shirt companies and wacky stunt products," she says. "These people were getting millions of hits and making a video for \$300, and some of them weren't very good at promotions."

She and Hitviews work with the advertisers and personalities to limit the number of promotions and make sure that a particular personality integrates the sponsor in ways that are true to the ordinary content of the show and to the interests of the audience.

"I won't let them make too many paid promotions," says Hill. "It is bad for the client and the talent."

Although Buckley does do occasional promotions for TV and film properties, he makes much of his income from YouTube's own partner program, which shares ad revenues with the most popular video makers.

"At first, they were serving banner ads over the videos, and the money was very small," says Buckley. "I thought I would never make it. But then they ran ads in the bottom of the video, and the revenue went way up."

Hill estimates that more than 20 video personalities earn a sustainable income

from their online work, and Johnson has heard of some sponsorships from cosmetics companies paying \$40,000 or more a month. She herself avoids direct promotions of sponsors, feeling that there has been a backlash against over-commercialized video blogging.

"I know a lot of them are making incredible income," she says, "but I haven't done [paid sponsorships] because I feel people trust what I say." In addition to revenue from Google advertising, Johnson has parlayed the online fame of her video blogs into live "Glaminar" make-up classes.

Don't Call It Viral

There is also online video success apart from YouTube and the star track. "We never use the term 'celebrity,'" says Kimberley Blaine, vlogger turned video producer and syndicator for content aimed at helping moms with child-rearing. "We call them 'power moms.'" Blaine's *The Go-To Mom* (www.thegotomom.tv) gets placement on major media and parenting sites. But now, with a substantial sponsorship from Sony, she teaches other mom vloggers how to up their game with better production values and technology. Her new *MommytoMommy.tv* series features lifestyle content with and about other online "mompreneurs" who have made a business of posting multimedia on the Web.

Rather than experience YouTube viral success, Blaine, a trained child and family therapist, saw other moms posting videos of them playing with their babies. "I thought I could do that and educate moms about how to sing to their babies," she says. When she showed her singing-to-baby lessons to some of the traditional magazine Web sites, "they bought them . . . then they bought 12."

"Now," she says, "I am on 20 sites and can get 50,000 views from just one."

Blaine built a business out of creating and selling videos to others and locating a major sponsor who could help underwrite production costs. Once-amateur vloggers such as Blaine and Buckley have found

where [advertisers] pay a couple of hundred dollars to \$2,500 to do a video where they talk about their product."

A very popular spin-off of beauty tips is called the "haul video," in which these online stars spend hundreds of dollars at a favorite shop (or a sponsor's store) and upload a video showing off their "haul." The beauty genre of video has been especially disruptive of traditional media because these videos are assembling the same audiences that cosmetics manufacturers spend billions to reach via TV and print. Johnson says she has fans from as far away as Norway and Japan, and this kind of grassroots appeal is shaking up the cosmetics advertising world.

"[Advertisers] don't know how to process it. My blog gets more views per day than the average magazine gets in a month in circulation."

A Little Big Business

Advertisers have indeed taken notice of Web stardom and have actively recruited them for all manner of in-show mentions, special appearances, and novel promotions. To promote its new album, the alternative rock group Weezer took YouTube by storm one week in September 2010 by making guest appearances in some of that week's videos from YouTube's most popular video celebrities. Car maker Kia recruited the creators of ShayCarl, LisaNova, and Smosh to judge a contest involving user-generated videos around the branding message of the Kia Soul.

Matching sponsors with the right Web stars has become a cottage industry unto itself. Hill is now creative director for Hitviews (www.hitviews.com), a company

increasing expectations from competitors and users requires corresponding higher production values.

"It was Flash, then widescreen, and then HD," says Blaine. "The technology is changing so quickly that by the time I sign a contract with some company the technology has changed." She promotes Sony's affordable line of HD camcorders to her mom vlogger audiences by using them in segments and explaining how they work.

Like many video stars, however, Blaine and Hill make one thing very clear about their online businesses: "I don't once mention 'viral,'" says Blaine. "To me, 'viral' is an entertainment word, something that a TV commercial does online."

In fact, unlike the massive traffic spikes that accompany video crazes such as the Old Spice Guy series or Keyboard Cat (and its derivatives), these entrepreneurs insist that viral distribution is too uncertain a method on which to build a business. Hill's partners and popular Web stars such as Buckley and Johnson are not one-hit



Michael Buckley of "What the Buck?!" is among the longest-lived Web stars, with nearly a million followers since 2007.

marks a turning point in all of media.

"We are in a time of the personal media entrepreneur," he says. All of the old network gatekeepers are dissolving, and anyone with a camera

wonders. Their medium may be new, but their longevity and attractiveness to sponsors are based on some of the tried-and-true principles of media—building predictable, regular audiences.

"Viral videos are the ones that make the news, but they rarely ever generate any success," says Hill. "Most of the people we deal with are getting 1 million views every time they post."

The founder of Hill's company, former NBC radio executive Walter Sabo, believes that the rise of Web stars with persistent, reliable followings

and audience will be able to attract the all-important sponsor dollars that once went to prime time. The 30-second spot that generates billions of dollars for TV networks will become less effective, and advertisers will turn to the people like Buckley, Blaine, and Johnson, who will make more compelling and honest promotions for sponsors on their own.

"They will put media money in the hands of individuals and say 'have at it,'" Sabo says. ■

BY STEVE SMITH

"My Brain Exploded": Michael Buckley Recounts His Success

One of the earliest Web video stars is still one of the most popular. The effervescent Michael Buckley's pithy comments on pop culture/realty show commentary "What the Buck?!" have brought him nearly 1 million YouTube subscribers and almost a quarter billion video views since the show launched. But, according to Buckley, he once thought user-generated video on YouTube was "kind of creepy."

CPU: So what happened, Michael, to start this rise to Web stardom?

Buckley: In the summer of 2005, I started doing a show on public access TV just for fun and to

get clips of me on camera. In the summer of 2006, my cousin started posting clips on YouTube. I thought it was kind of creepy and strange. In November 2006, I had 320,000 views, and my brain exploded. I thought . . . "there is such potential to reach a large audience."

I started posting four or five times a week and was one of the first people to do that. I left my day job in 2008 and have been living off of YouTube. It kept increasing and has been sustainable. I make much more than I had been making before YouTube.

CPU: Speaking as one of the veterans of YouTube stardom, how has it changed in just the last few years?

Buckley: It is crazy. YouTube is so different. It is so competitive now. A lot of people wanted to get into this. A lot of them had been going the traditional media path and said, "No, I am going to get on YouTube."

I just keep going along my own merry way. I have upgraded my equipment. YouTube is in HD now, so it is looking better. I have to cover things a lot faster now before everyone is done talking about it. Twitter has changed a lot of this in terms of getting things.

CPU: Even in the midst of heavy new competition, you remain wildly popular. What is the secret of sustained success?

Buckley: The key to YouTube is engagement. You have to be engaged. The people who are the most popular are the ones who nurture their audience. That is always my focus. I was getting too many emails to respond to all of them, but there are other ways to engage. I always respond to comments.

CPU: Did Hollywood or TV ever come knocking?

Buckley: I had a development deal with HBO, and nothing came of that. It seemed like a nice offer, and I am not against going to TV. But my life is so enjoyable being home and generating revenue. It would take a lot to get me onto TV. My value is on the Internet. I make more money. ■

Yeah, we know you have blogs to post, video to encode, reports to write, and code to compile. We do, too, but you have to take a break once in a while (and maybe blow some stuff up). That's why each month we give you the lowdown on what to expect from the latest interesting PC and console games.

ASSASSIN'S CREED BROTHERHOOD

Room To Roam
—by Dr. Malaprop

\$59.99 (X360, PS3) • ESRB: (M)ature • Ubisoft • assassinscreed.com/brotherhood

We had many good things to say when we reviewed Assassin's Creed II last year and made it runner-up for our 2009 Game Of The Year. If you enjoyed ACII, you'll find that Brotherhood, which is a direct follow-up to ACII, is an engaging game that lets you continue Ezio Auditore's 16th century adventures as a master assassin while Desmond Miles gets a larger gameplay role in the present.

Ezio is barely home in Monteriggioni for some well-deserved R&R before the Borgia launch an offensive that wreaks havoc on the little Italian town. Cesare Borgia steals an item of great value and brings harm to the locals. A family member and Ezio make their way to Rome for revenge. The game doesn't really hit its stride for a couple of hours, so be patient if its richness isn't immediately apparent.

Brotherhood maintains the core play mechanics of ACII but with several improvements. Rather than having more money than you could possibly need to upgrade a villa, you now upgrade Rome. And there's something magnificent about

buying the Coliseum. Horses are more useful in both transportation and combat as you move about Rome, though they're made somewhat redundant by the new fast-travel system. Improved enemy AI when fighting against groups sees negligible improvements, but enemies still queue to fight you. You also have new moves in combat. However, our favorite new feature is the ability to recruit citizens and build them into full-fledged assassins that can support you on missions. We never tired of the thrill when we called in our brotherhood of assassins to provide assistance or fully engage enemies. Following a target and then seeing our protégé leap down from a roof onto a hapless enemy never failed to bring a smile. You'll spend time sending your assassins out on training exercises to develop them, and you'll find the process of grooming your brotherhood to be satisfying.

The majority of Ezio's time is spent in Rome. If you are concerned that spending most of your time in a single city may be too limiting, take comfort in knowing that Rome is massive.

You'll spend hours unlocking its secrets playing through the storyline and side quests. The developers have done a fine job portraying Rome in the period. As someone who's had the good fortune of visiting Rome on multiple occasions, Brotherhood's take feels authentic and true to the real city, right down to recognizable landmarks.

Multiplayer was heavily promoted, and we enjoyed the non-twitch experience of many of the modes compared to the likes of recent Call of Duty games. Our favorite entails having as many as eight players, each with a unique character model. Each player is assigned to take out one of the other eight, with each player having an identical clone AI for disguise. The trick is bluffing and figuring out who your real target is for the takedown. More traditional death-match and team deathmatch modes are also available.

Environmental artwork and architectural details are beautiful, as is the overall environmental ambience. However, the game still has pop-in objects and texture loads. Perhaps the upcoming PC version will rectify this. Character models don't hold up as well as the environments, and game developers haven't addressed some of the sloppy movement issues. Overall, Brotherhood is a welcome feature-packed evolution on the way to Assassin's Creed III. We loved being here and roaming through Rome. ■





NEED FOR SPEED HOT PURSUIT

Cops & Robbers In The Fast Lane—by Dr. Malaprop

\$59.99 (X360, PS3); \$49.99 (PC, Wii) • ESRB: (E10+)verybody 10+
Electronic Arts • hotpursuit.needforspeed.com

Criterion, the developer behind the Burnout racing series, makes the Need For Speed franchise relevant once more. Races occur in fictional Seacrest County, where you'll find an open, Burnout-style map and no cheesy cutscenes. Racing feels somewhat like Blur but well short of Forza or Gran Turismo 5.

You'll opt to play as a cop or racer, with each career path unlocking vehicles and weapons specific to that path. You'll have 60 racer and 48 police events at your disposal, and you can switch easily between each. There's a nice blend of standard races and pursuits where, as a cop, you're trying to bust racers. Unlike more "serious" racing games, the only tuning required to your car will be color choice. And your racing experience carries over between single and multiplayer modes.

We liked the Autolog feature that brings social aspects into the game by providing motivation to compete against friends as well as show off times and post in-game photographs and comments. The game will suggest new friends so you can build a small multiplayer community against which you can compete. Autolog ups the ante on leaderboards without adding complication.

Races have shortcuts, cops gain boost by driving fast and drafting, and each side has four upgradable weapons. Weapons such as the EMP and spike strips add variety. Cops can call in roadblocks and police choppers while racers can deploy jammers or use their turbos. Rage-induced driving and weapons are what cops will use to wear down racers to get a bust.

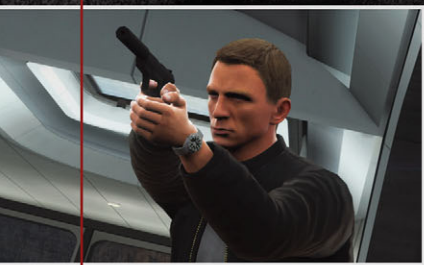
Environments look gorgeous with coastal highways, forests, and wide open desert roads kicking up dust. Cars look great but don't match Premium Cars in Gran Turismo 5. We were disappointed to not find a proper cockpit view, but if you're looking for a fun racing game, Hot Pursuit delivers. ■



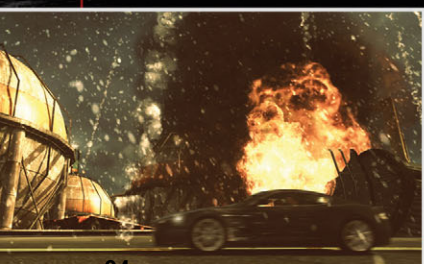
BLOOD STONE 007

Shaken Or Stirred?—by Josh Compton

\$59.99 (X360, PS3); \$49.99 (PC); \$29.99 (NDS) • ESRB: (T)een
Activision • www.bloodstonegame.com



James Bond can't seem to get a break lately. The latest Bond movie is having difficulty getting off the ground, and the games have been in a rough patch for the past few years. Bizarre Creations, makers of the Project Gotham Racing series and The Club, aimed to bring success back to the game series with James Bond 007: Blood Stone, a third-person shooter with racing elements. However, it missed the mark, but not for lack of trying.



Blood Stone's story is pretty standard for a 007 adventure. You travel the world fighting generic characters and trying to stop the villain from successfully following through with his evil plan. Other than that, there isn't much to the game as you race from objective to objective and kill many a henchman. In addition to the story, Blood Stone features a multiplayer component (16 players max) that consists of spies vs. mercenaries in a series of deathmatch and objective-based modes.

The graphics aren't great, but they work well enough to give the game a James Bond feel.

The likenesses of Daniel Craig and Dame Judi Dench, as well as their voices, are featured in the game. Joss Stone is the game's Bond girl playing Nicole Hunter, a jewelry designer.

Gameplay is where Blood Stone shines in spots. The game follows the Call of Duty model for its shooting sequences, and the mechanics work well. You don't have any gadgets to help you except for your smartphone. There are stealth moments where you can sneak up on enemies and take them out with hand-to-hand combat. The racing segments are interesting but sometimes overly difficult and feel very trial and error.

With Blood Stone, Bizarre Creations tried to combine a great racing game with a great third-person shooter. The result is an uneven game that is decent but not great. The unvaried and repetitive nature of the action and racing sequences makes gameplay mundane and even tedious at times. Overall, the game is a reasonably fun experience for fans of the Bond series. ■

ABOVE THEM ALL IS

the DRAGON RIDER



DRAGON RIDER

USB 3.0, eSata Support

Designated CPU Fan

Cable Routing Management

Extreme Thermal Solution

New E-ATX Full Tower for the
Most Extreme Gamer



www.inwin-style.com



FIREPOWER

YOU CAN COUNT ON



TOP MOUNT EXHAUST

1X120MM FAN, OPTIONAL 1X120MM FAN



FRONT INTAKE

1X120MM FAN W/FULL MESH GRILL



BACK EXHAUST

1X120MM FAN W/WATER COOLING READY



SIDE INTAKE

1X180MM FAN W/AGGRESSIVE SIDE PANEL



BOTTOM INTAKE

OPTIONAL 120MM FAN



TOOL-FREE INSTALLATION

TOOL-FREE DESIGN FOR QUICK AND
EASY INSTALLATION



EASY CPU COOLER INSTALLATION

FLEXIBILITY INSTALLATION FOR CPU COOLER



BUILT IN FAN CONTROLLER

SUPERIOR AIR FLOW VENTILATION



TOP MOUNT I/O PANEL

CONVENIENT TOP I/O PANEL
ENABLES EASY ACCESS



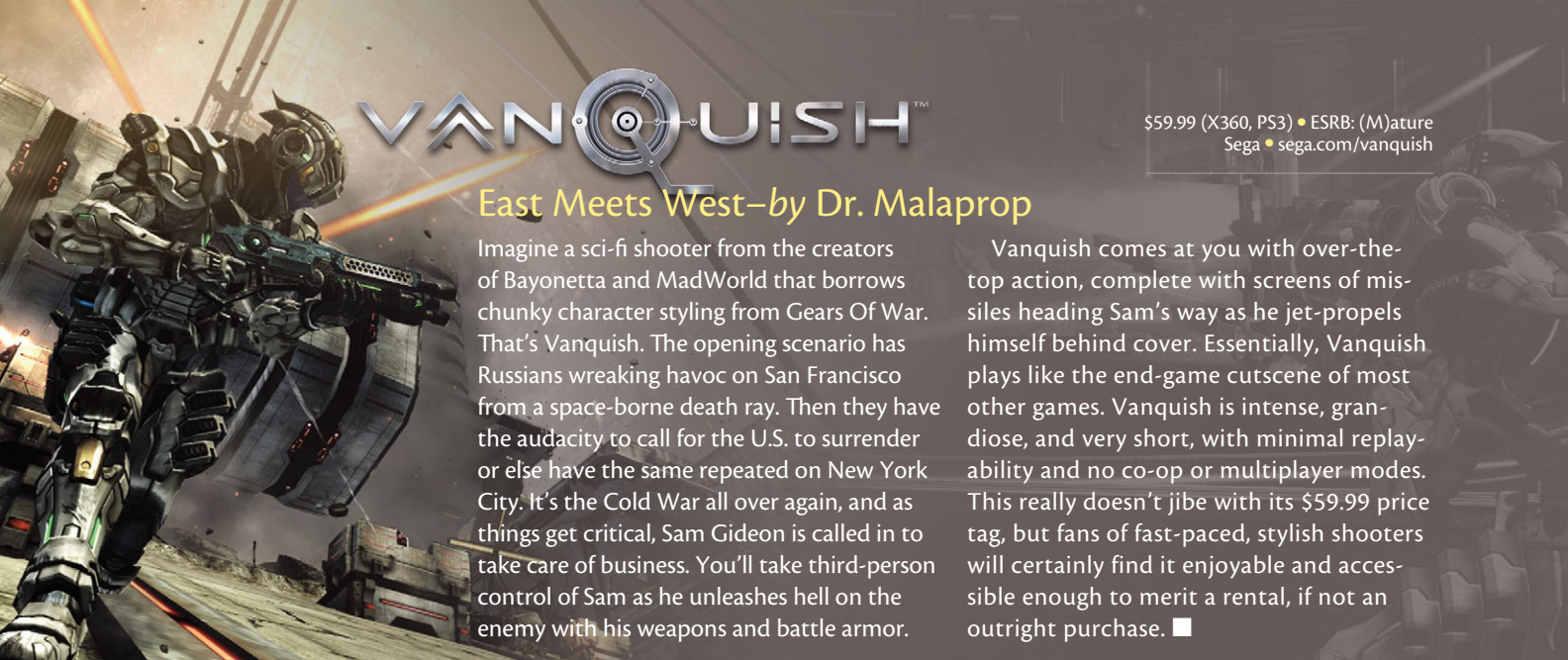
LX SERIES

Galaxis' line of PSUs offer up to 750W of muscle in a modular cable design. Compatible with ATX12V v2.3 and EPS12V v2.92 standards and feature dual, independent +12V rails and a thermally controlled fan for improved airflow and heat dissipation.



ARES

Engineered for power and performance, Ares sports easy front-side access to ports used most often and ample external/internal drive bays and expansion slots for the storage and graphics cards you own now and will add in the future.



VANQUISH™

\$59.99 (X360, PS3) • ESRB: (M)ature
Sega • sega.com/vanquish

East Meets West—by Dr. Malaprop

Imagine a sci-fi shooter from the creators of Bayonetta and MadWorld that borrows chunky character styling from Gears Of War. That's Vanquish. The opening scenario has Russians wreaking havoc on San Francisco from a space-borne death ray. Then they have the audacity to call for the U.S. to surrender or else have the same repeated on New York City. It's the Cold War all over again, and as things get critical, Sam Gideon is called in to take care of business. You'll take third-person control of Sam as he unleashes hell on the enemy with his weapons and battle armor.

Vanquish comes at you with over-the-top action, complete with screens of missiles heading Sam's way as he jet-propels himself behind cover. Essentially, Vanquish plays like the end-game cutscene of most other games. Vanquish is intense, grandiose, and very short, with minimal replayability and no co-op or multiplayer modes. This really doesn't jibe with its \$59.99 price tag, but fans of fast-paced, stylish shooters will certainly find it enjoyable and accessible enough to merit a rental, if not an outright purchase. ■

ROCK BAND 3

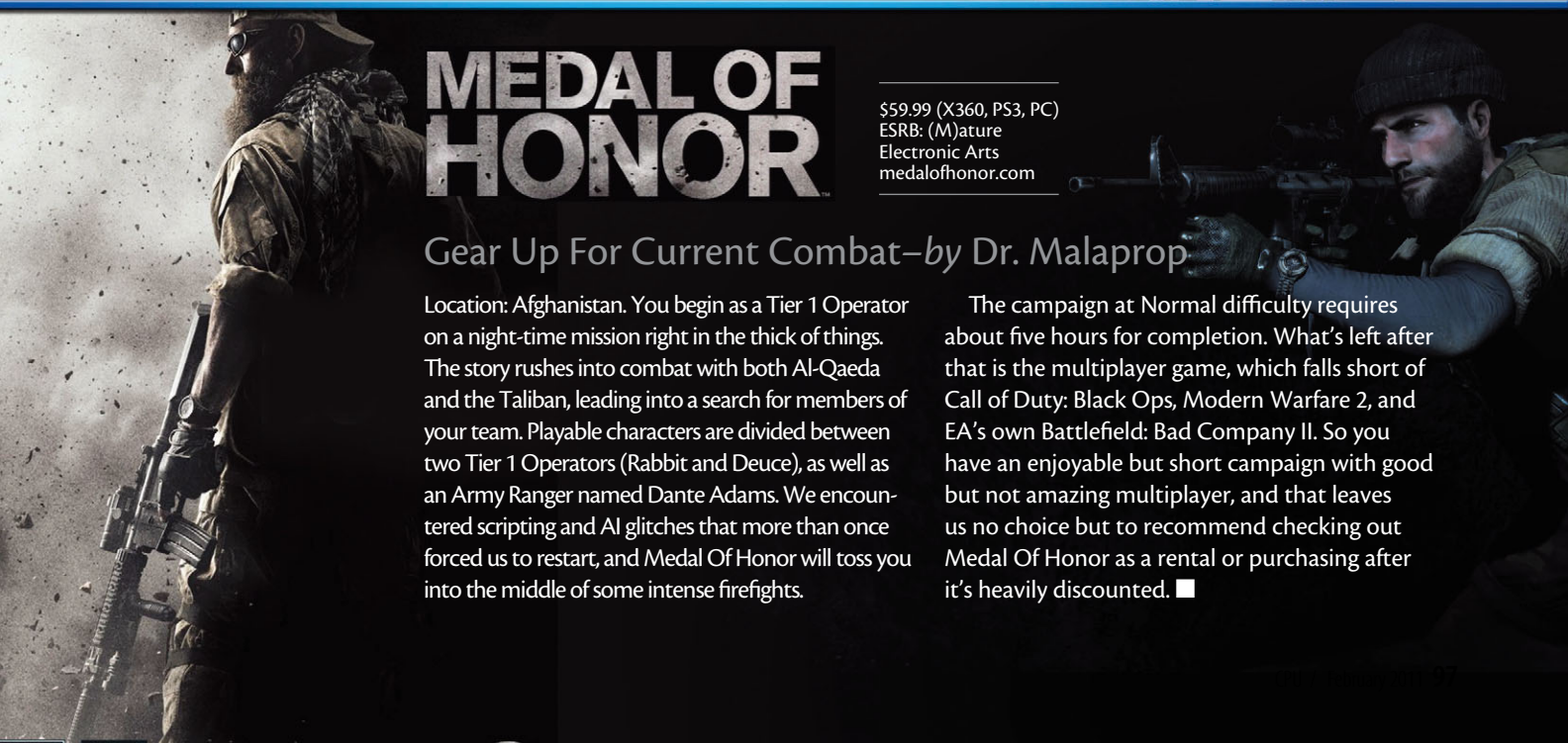
Innovation In Evolution —by Dr. Malaprop

\$59.99 (X360, PS3); \$49.99 (Wii) • ESRB: (T)een
Electronic Arts • rockband.com/games/rb3

The introduction of the drum kit to Rock Band and Guitar Hero was a first step in learning to play a real musical instrument. Developer Harmonix significantly ups the ante in its third iteration of Rock Band with the addition of a new keytar and two guitar peripherals. All provide gamers with an opportunity to learn

real instruments. The Rock Band 3 Squier Stratocaster (sold separately) is a full-sized six-string guitar that tracks finger positions in real time for gameplay and lets you transition into using it as a real six-string with an amp. The Mad Catz Fender Mustang Pro (sold separately) is a similarly sized guitar with 102 buttons replicating the string experience that's gentler on unseasoned fingers. Toss in Rock Band 3's Pro mode, a step beyond Expert, and you're darn close to authentic instrument playing.

Otherwise, RB3 is exactly what you'd expect from the franchise: lots of instruments, a diverse variety of new tracks, and backward compatibility with songs from past games (although they're not supported by Pro mode). There is no better rhythm game on the market today. ■



MEDAL OF HONOR

\$59.99 (X360, PS3, PC)
ESRB: (M)ature
Electronic Arts
medalofhonor.com

Gear Up For Current Combat—by Dr. Malaprop

Location: Afghanistan. You begin as a Tier 1 Operator on a night-time mission right in the thick of things. The story rushes into combat with both Al-Qaeda and the Taliban, leading into a search for members of your team. Playable characters are divided between two Tier 1 Operators (Rabbit and Deuce), as well as an Army Ranger named Dante Adams. We encountered scripting and AI glitches that more than once forced us to restart, and Medal Of Honor will toss you into the middle of some intense firefights.

The campaign at Normal difficulty requires about five hours for completion. What's left after that is the multiplayer game, which falls short of Call of Duty: Black Ops, Modern Warfare 2, and EA's own Battlefield: Bad Company II. So you have an enjoyable but short campaign with good but not amazing multiplayer, and that leaves us no choice but to recommend checking out Medal Of Honor as a rental or purchasing after it's heavily discounted. ■

Disney EPIC MICKEY

Dark Tales—by Dr. Malaprop

Epic Mickey takes Disney's Mickey Mouse on an adventure into a place called Wasteland after Mickey inadvertently spills paint thinner on the world and turns it into a dark, depressing place. Think of Wasteland as an alternate, Disneyland-like theme park populated by rejected and lost-to-time characters from Disney's historical archives. Mickey's inventory includes a magic paintbrush which you can use to paint or thin. Painting tends to be more challenging but is more heroic. Thinning more directly addresses Mickey's needs at cost to others. Painting is the game's core mechanic and exercise in moral decision-making, but the process is double-edged.

Disney is making a third-person platformer with RPG elements, but the in-game camera takes getting used to and never quite feels comfortable, which may turn away players. However, fans of early Disney animation will find much in Wasteland to discover and delight in. The game features approximately 15 to 20 hours of gameplay and could benefit from a second playthrough. If you can get past the game's problems, there's an engrossing adventure to be had. ■



\$49.95 (Wii) • ESRB: (E10+)everyone 10+
Disney Interactive Studios
disney.go.com/mickey/#/disney-epic-mickey



Sony's Premier Driving Simulation —by Dr. Malaprop

\$59.99 (PS3)
ESRB: (E)everyone
Sony Computer Entertainment
gran-turismo.com

Gran Turismo 5 has been a long time in the making. The game's focus is the A-Spec, which features 45 events. You'll start with everyday cars, such as a tuned-up Honda Civic, and work your way up to exotic supercars. The game features 1,000 cars, divided into 200 jaw-dropping premium models and 800 less-impressive standard vehicles. The premium cars are stunning inside and out, but the standard cars surprisingly don't include in-cockpit views. You'll race both types in races, and the differences are painfully obvious. Additionally, you'll find NASCAR, kart, and rally racing.

Driving mechanics are what GT has always been about, and tuning cars has a very tangible effect. The tracks are modeled in painstaking detail and will bring a smile to anyone who loves racing cars. ■



TRON

EVOLUTION

THE VIDEO GAME

Bridges The Old & The New —by Dr. Malaprop

\$59.99 (X360, PS3); \$39.99 (PC) • ESRB: (T)een
\$49.99 (Wii) • ESRB: (E10+)everyone 10+
Disney Interactive Studios • disney.go.com/tron

Fans of the 1982 "Tron" movie have a lot of nostalgia for the world inhabited by bits, battling light cycles, and flying discs. Disney released Evolution as a tie-in for "Tron: Legacy," now in theaters. The game bridges the story between the original and new films. You'll play as Anon (for Anonymous), a System Monitor program sent into the system by Kevin Flynn to investigate suspicious circumstances in Tron City and to prevent Clu's rise to power.

As film tie-ins go, "Tron: Evolution" is not an exemplary game. It inexcusably

omits a light cycle combat sequence in the repetitive campaign. The game wants to channel Assassin's Creed for movement as you wall-run and leap onto platforms before fighting enemies. Cutscenes carry the story forward. In spite of that, we found ourselves playing through to the end because of the intriguing prequel narrative. Finish the game, and then watch the movie. You'll hear references to plot points from the game. Evolution is not exemplary, so enjoy it for the story if not the gameplay. ■



High-performance products and excellent quality.

SENTEY GIVES YOU THE CHOICE BETWEEN DIFFERENT PRODUCT LINES IN A RANGE OF OPTIONS
IDEAL FOR "GAMER ENTHUSIASTS", HOME OR OFFICE.

EXTREME DIVISION

- Cases specially designed for high performance from the casual gamer to the enthusiast.

CASES

- For office or home use our chassis are designed with the highest quality material to meet all your needs.

POWER SUPPLY

- Our power supplies meet and exceed industry standard.



SOLID POWER SS

Available: 550w / 650w / 750w / 850w



GOLDEN STEEL POWER SM

Available: 650w / 750w / 850w / 1000w

www.sentey.com - info@sentey.com

sentey
BUILDING DREAMS®

DISTRIBUTORS:



Group Policy Editor Shenanigans, Continued

Registry Tip Of The Month

The Group Policy Editor we've been talking about is not just a front end for many settings that you can find in the Registry. It's also an easy solution to keep others from tinkering with the Registry itself. In GPE, go to User Configuration>Administrative Templates>System. In the right pane, look for "Prevent Access To Registry Editing Tools." Enabling this setting will block a user from loading Regedit. Instead she will see a warning that the administrator has blocked access to the program.

You can also fine-tune this setting. Double-click the entry, and you will see the following in the Options box: "Disable Regedit From Running Silently?" Choosing Yes will prevent even .REG files from making changes to the Registry when you double-click them, while setting this to No will allow those patches to be applied to the Registry even if Regedit is unavailable for launch.

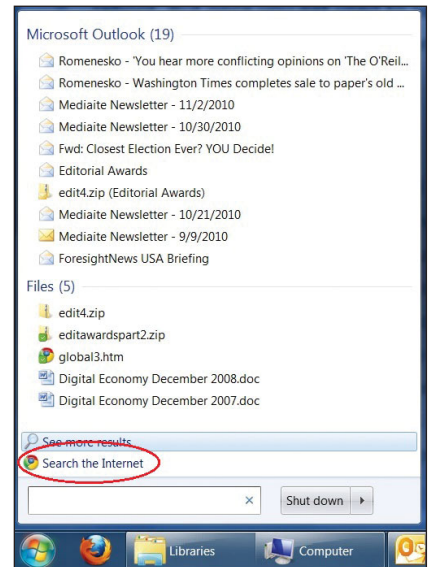
As we revealed last time, the Group Policy Editor, which is available to Windows 7 Ultimate and Professional users, is candy for tweekers. It pulls together in a single place many of the levers, Registry hacks, and options that are scattered throughout the OS and/or often kept beneath the hood. Now that you are acquainted with the basics of the GPE, let's dig into some more of its treasures.

Once again, to launch GPE, type **group policy** in the Start search box. Generally, the Computer Configuration and User Configuration sections are alike, except that changes made to the former will affect any user logging onto the system while tweaks to the latter apply only to the currently logged in user.

Here's a little usability tip for the GPE as we direct you to different settings: In the right pane of the Editor, click the Setting bar at the top of the window to alphabetize the listings to easily find those we single out.

Life's Little Conveniences

The GPE can suppress many of the little annoyances that Windows throws your way. For instance, if you dislike the cluttered look of all those uninformative icons in your Taskbar, go to User Configuration>Administrative Templates>Start Menu And Taskbar. Open the setting "Hide The Notification Area" and toggle Enabled. (Applying the change will require log off/logon.) This will



One of our favorite switches in the Win7 Group Policy Editor turns on a Search The Internet option that turns your Start search box into a Web-wide search query.

leave only the clock and date in the lower-right corner of the Task Bar. If you are a real minimalist, you can even eliminate the clock and calendar with the setting "Remove Clock From The System Notification Area."

For streamlining your Windows productivity, this Start Menu And Taskbar area of the GPE is worth experimenting with. One of our favorite quick productivity tweaks is to add an option to the Start search box for searching a term on the Internet. Staying within the Start Menu And Taskbar branch from above, look for "Add Search Internet Link To Start Menu." Enabling this adds the option to "Search The Internet" with your default browser and its default search engine. The effect of this change is immediate and doesn't require a reboot. Once you're used to searching the Web without having first to load your browser, you'll never go back.

If you're tired of using the shared family computer only to find that someone has pinned a ton of new programs to the

Windows Tip Of The Month

We know that you're no novice when it comes to dealing with Windows. And yet Windows makes us go through the same delete confirmation dialog box to confirm any file or folder deletion. The simple cure for removing this Windows version of childproofing is, well, child's play. Simply right-click your Recycle Bin to bring up the Properties window. Uncheck the box at the bottom of the window labeled "Display Delete Confirmation Dialog."

Taskbar that are useless to you, then here's the lockdown toggle you need. Still in the same branch, look for the "Do Not Allow Pinning Programs To The Taskbar" setting. Enabling this will prevent users from adding items to the Taskbar. In our experience, this only works half as well as Microsoft promises in its descriptions of the key. The GPE claims that the setting will also lock currently pinned programs, so they can't be removed; even after a reboot, we found that the GPE switch only kept us from adding—not subtracting—programs from the Taskbar.

And if you're touchy about people seeing what programs you tend to use on that shared computer, keep in mind that Win7 personalizes the Start menu by including

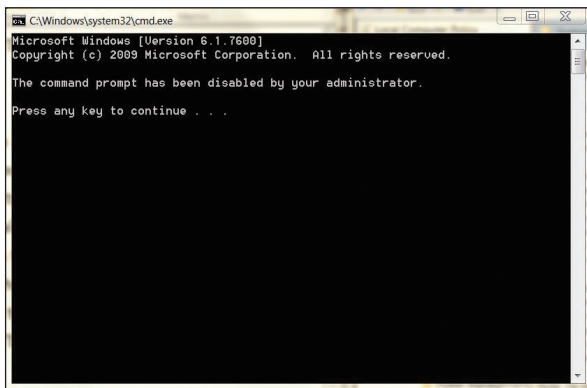
Setting lets you also disable batch file (.CMD or .BAT) execution. You may want to keep this option off (set to "No") because it can interfere with some program installation routines and memory resident programs that load at startup.

Finally, in the realm of maintaining security, you can prevent users from modifying the permissions you set for files and folders. Go to the User Configuration>Administrative Templates>Windows Components>Windows Explorer branch. Find "Remove Security Tab" and enable it. This removes the tab on a file or folder's Properties window that accesses permissions.

and enable the "Do Not Allow Windows Media Center To Run" setting. Likewise, you can disable a user's access to Sound Recorder, Windows Mail, Mobility Center, Calendar, Gadgets, and Messenger.

Are you a little put off by Win7's minimalism and find yourself pressing the ALT key often to bring up the more familiar top line menu structure in many windows? You can restore that old Windows feeling by going to User Configuration>Administrative Templates>Windows Components>Windows Explorer. Look for "Display The Menu Bar In Windows Explorer." Enabling this will put the menus back on Explorer windows. ■

BY STEVE SMITH



A simple GPE toggle will prevent an overly ambitious user from launching a command line window.

programs that you start frequently. To remove these programs from the Start menu and keep the OS from tracking your patterns, find the "Turn Off User Tracking" setting and enable it.

And if you want to keep that pesky know-it-all tech amateur from running a command line interface on a PC, yup, there is a GPE fix for that. Go to User Configuration>Administrative Templates>System and double-click Prevent Access To The Command Prompt. You can see that there are advanced states for this setting. The standard setting will simply give users a command line window that tells them the administrator has disabled the Command Prompt and then kicks them back to Windows. The Options box in this

title you would like to appear at the top of every IE window. The tweak is more fun than functional, as it adds to the pre-existing title "Windows Internet Explorer" the new phrase "provided by . . ." and whatever you typed into the setting's field.

The mother lode of tweaking in the GPE is the User Configuration/Administrative Templates/Windows Components branch. We'll be drilling into more details here in later columns; for now, here are some top level tweaks. Using GPE, you can enable or disable several Win7 features, such as the Media Center. If you want to keep the WMC available to you but not to others, go to the Windows Media Center sub-branch

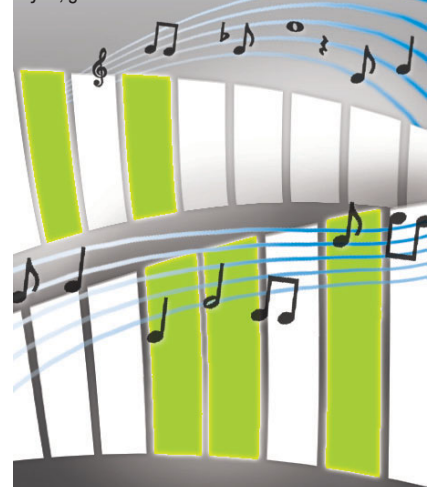
Just Playing

There are a number of little tweaks you can activate in the GPE that let you play with a little power. For example, to change the Internet Explorer Title Bar, go to User Configuration>Windows Settings>Internet Explorer Maintenance>Browser User Interface. In the right pane, double-click Browser Title. In this window, check the box next to Customize Title Bars and type into the field below whatever

INFINITE LOOP

Become The Kinect You Were Born To Be

At this point, does anyone even use Microsoft's motion-control system to actually play Kinect games? Maybe the better question is "Who *wouldn't* want to grab a bro and jam out 'Heart and Soul' on a human-sized keyboard, a la 'Big'?" After apparently solving the most difficult problem—the matter of who got to be the irrepressible Robert Loggia—these dudes used a hacked Kinect and Keyboard Anywhere to re-create the famous scene. We salute you, gentlemen!



Source: www.engadget.com/2010/12/14/kinect-hack-lets-you-reenact-big-piano-scene-video

An Interview With Public Knowledge's Sherwin Siy

Sherwin Siy is deputy legal director and the Kahle/Austin Promise Fellow at Public Knowledge, where he focuses on emerging copyright issues and their international effects on IP and technology policy. Before joining PK, he served as staff counsel at the Electronic Privacy Information Center, working on consumer and communications issues.

BY BARRY BRENESAL

CPU Let's start with a few basic facts, beginning with the current copyright infringement bill working its way through Congress. It's known as the Combating Online Infringement and Counterfeits Act, COICA. The reason for its existence is a concern with widespread online piracy. The bill is intended to provide the government with teeth to deal with pirate Web sites, allowing them to blacklist these sites from the Domain Name System, ban credit card companies that handle U.S. payments to them, and forbid advertising with them. Do you want to add anything to that?

Siy I think the government already has teeth. This would give them additional powers they don't already have. There are certainly plenty of things the government can do to combat online infringement right now.

CPU So it would be Public Knowledge's position that this bill is not necessary?

Siy On balance. Those additional powers probably aren't that helpful, and pose the risk of doing a great deal of harm.

CPU That being the case, why did this bill recently get through the Senate Judiciary Committee with unanimous support? Everybody knows it's very rare to get such a lineup of opposing interests coming in one side.



Siy I think one of the reasons is that nobody wants to be seen as being pro-piracy, and I don't think anybody is. But I don't think that some of the technical details that COICA can create were fully explored by the committee.

CPU What details do you have in mind?

Siy For example, how COICA monkeys about with the DNS server settings. This can lead to a bunch of problems—such as how difficult it would be to implement, or what you do with sub-domains. In addition, there are global political repercussions.

There's already a huge controversy over how much influence the United States has over the Internet, rightly or wrongly. ICANN, the Internet Corporation for Assigned Names and Numbers, is based within the U.S. The

major generic domains—.COM, .NET, .INFO, etc—are almost all based within the U.S. Now, one of the things COICA does is focus upon registries. Not just registrars, and certainly not servers, but registries that are located within the U.S. That would include VeriSign, so .COM and .NET.

CPU You make what you refer to as “monkeying with the DNS” sound like making adjustments to DNA. Surely black-listing pirates that are located in the U.S. from the DNS is not quite so controversial?

Siy But that's the problem. It's not actually dealing just with sites based in the U.S. In fact, if the sites are based in the U.S., there are plenty of ways to go after them. There are ways to go after a site whose servers are based overseas but whose domain name is based in the U.S. One of the reasons that people have been saying that the bill is necessary is to go after Web sites that are hosted overseas, hosted on domain names that are foreign-based.

So, for example, if someone has a Web site called ACME.RU that I want to shut down, COICA would allow the Justice Department to send directives to U.S.-based ISPs telling them they cannot connect users to ACME.RU. Their DNS servers would then be inconsistent with the rest of the DNS, which is exactly the opposite of what's supposed to happen. What that does is create incentives

PHANTOM

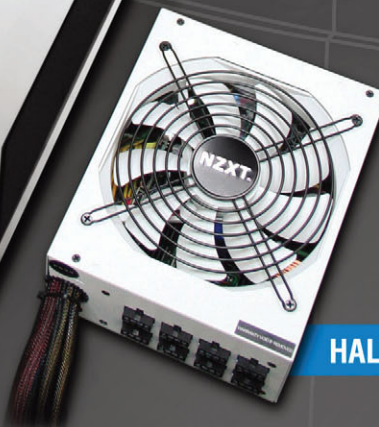
Enthusiast Full Tower

NZXT.
WWW.NZXT.COM

Establish The Power, The Presence.

NZXT presents the cutting edge Phantom Full Tower Chassis. Designed with sleek, pristine contours, the Phantom radiates personality and quality. As with all NZXT products, we strive to set apart our customers from the rest with unique, original designs – we run the extra mile so you won't have to settle with the typical rectangular box.

The Phantom delivers high performance cooling advantages with triple 200mm fans and fits up to 7 total fans, dual radiator support, quad watercooling cutouts, and five 20W per channel fan controls. E-ATX support, an innovative 5.25" screwless system, vast space to encompass 7 hard drives, and five 5.25" bays enable smooth customization.



HALE90 POWER SUPPLY

"...a great case for an overclocked high-end system."
-Bit-tech.net

"...a very stable, very efficient, and very powerful example of
power supply engineering." -JonnyGuru.com



SENTRY LXE



FANS



24-PIN CABLE



SLEEVED LED KIT

for people to switch from these more established DNS systems and go to some third-party DNS systems. All that does is shift the problem, and set a precedent for saying that “Content we dislike we’re going to attempt to cut off the Internet that’s available to our citizens.” That specific procedure is something that we as a country have criticized heavily other countries for doing.

CPU Why is this a problem? It’s fairly standard activity for any government to criticize other governments for things that they themselves do. What’s unusual about the U.S. following that time-tested tradition?

Siy I think the point is that we have been holding ourselves out as an example of free speech, especially on the Internet. People will say, “Yes, China is going to block, regardless,” and that’s true. But the point isn’t trying to win the hearts and minds of the Chinese politburo. The point is that there are many other countries around the world that are engaging in censorship at the margins, and that we would want to discourage. Places such as Turkey, or Australia, for various reasons that we might disagree with—for *lèse-majesté*, or defamation rules, stricter ideas of what is indecent, or less robust protections.

CPU Let’s say there’s a pirate site in another country that the U.S. wants to block off communications with. What current mechanisms are in place to do so?

Siy First, if the site itself is infringing, then efforts will probably focus upon working with the law enforcement agencies of those countries.

CPU We know that in many instances that doesn’t work, and that there have been allegations some nations provide a safe

harbor within their territory, in exchange for a variety of services.

Siy That is a problem, but it’s not one that COICA actually solves. Nothing in COICA prevents anyone in the U.S. from connecting to those sites. It just makes it slightly more difficult—instead of trying to block access to a foreign Web site based upon an alleged violation here, all it does is block the resolution of the domain name.

Let’s say a site is blocked right now, and I want to see it. I could do one of two things. I could either type in the IP address and go to the site, or the site owner could use a different DNS provider. And that’s something that could be done in 30 seconds. There was a big Comcast outage a while back. The root of it was a problem with the DNS server. One of the workarounds was to set your DNS provider to be Verizon, Google, or someone else. All you had to do was go to your computer settings and change a few numbers, and you were up and running.

CPU I’m surprised the bill was formulated in such a way that it allowed for this.

Siy I think the reason was because people are extremely leery of wholesale blocking of the flow of information on the Internet.

CPU But in that case, why would anyone in your organization or any other oppose what sounds, at least upon its discussed merits, like a paper tiger?

Siy I’m not going to say that it shouldn’t exist because it’s completely ineffective. The reasons I think the bill shouldn’t pass have to do with its political implications, and its definition about what constitutes a site dedicated to infringing, among

other things. So there are all sorts of other problems with it before we get to its effectiveness, and those problems would persist. I’m saying COICA doesn’t offer enough of a speed bump to justify the unintended harms.

CPU Public Knowledge’s president has spoken of coming out with, to use her own words, a “more narrowly tailored bill” to COICA. What would such a bill have in it?

Siy The ability to target those who engage in business with sites that are clearly infringing. There are a lot of problems with the breadth of definition concerning this. I think that, too, would need to be narrowed. But I certainly think that the objectives of COICA in countering counterfeiting and piracy aren’t things we object to.

CPU The bill has gone through the Senate Judiciary Committee, as remarked earlier. Where does it go next, and what kind of a timeframe are we looking at?

Siy It’s hard to say. I know that Senator Wyden for one has specified that he is not a fan of the bill, and sees a lot of the problems that we’ve been seeing. As a result, he’s determined to put a hold on it until some of those issues get resolved. I would assume this is going to continue to be debated, as it’s an issue that’s pressing.

CPU Where do you want to see matters with COICA go at this point?

Siy What I’d like to see is more discussion, more debate, on some of these provisions. I’d like to see considerations of questions about technical stability and international implications addressed. A lot more can be done on this. ■

A Peek At What's Brewing In The Laboratory

by Anastasia Poland

3D Map-Making A Snap With UC Berkeley Backpack

Take a gander at the contraption on this guy's back and try to tell us you're not struck immediately with the thought, "Who ya gonna call? Ghostbusters!" And although the University of California, Berkeley researchers who developed this action-packed backpack are certainly interested in conquering the contents of big buildings, their mission is making 3D maps of the structures' insides, not slaying slimy poltergeists.

Berkeley's Video and Image Processing Lab, where much of the development on the project is taking place, offers a list of key areas where the researchers' novel work on 3D interior mapping would be utilized: "training and simulation for disaster management, counteracting terrorism, virtual museums, historical sites documentation, and mapping hazardous sites and underground tunnels."

Professor Avidesh Zakhor, project lead, explains that multiple sensors in the backpack scan and record the area surrounding the wearer; the system can process the 3D model in about the same amount of time as it takes the wearer to pace through the space she is recording. "Four or so laser scanners measure distance, four cameras take pictures, and an inertial measurement unit measures the

orientation of the backpack," explains Zakhor.

The biggest challenge in creating photorealistic 3D maps of the inside of complicated structures, according to Zakhor, is in "localizing the backpack," which means "finding out at

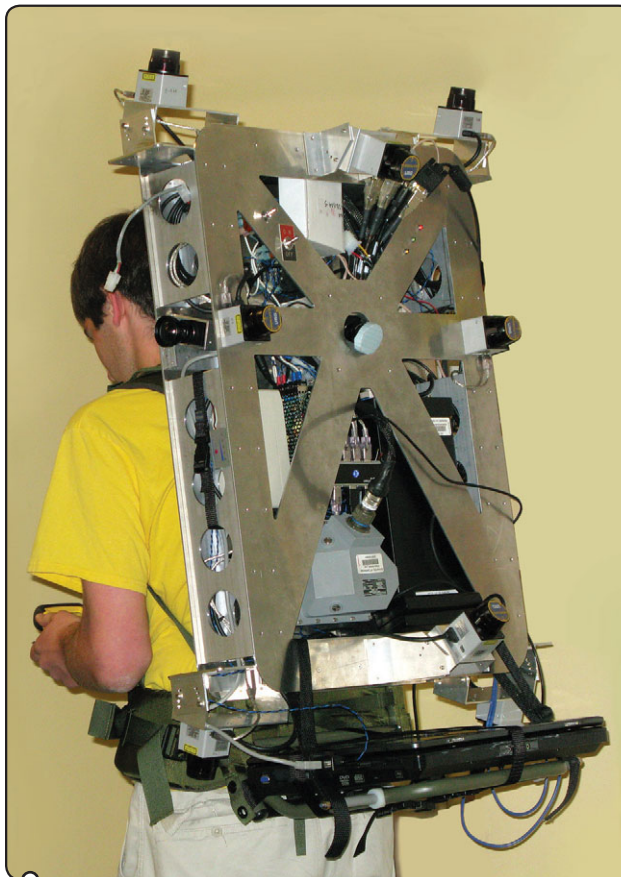
each instant in time, where it is in 3D space and what orientation does it have (yaw, pitch, roll)."

Zakhor and her team found that localizing was relatively simple by utilizing a pushcart setup or a robot on wheels; of course, neither was viable

for mapping more complex edifices, such as buildings with stairs. Undaunted, the researchers ended up programming new algorithms that "use lasers, cameras, and IMU all simultaneously in order to give us an accurate pose estimate of the backpack as a function of time," says Zakhor. The "function of time" refers to the fact that their algorithms are computing the user's pose and placement every 100 milliseconds. The researchers were pleased to discover that their new algorithms worked just as well mapping out the difficult staircases as it did on simpler T-shaped hallways.

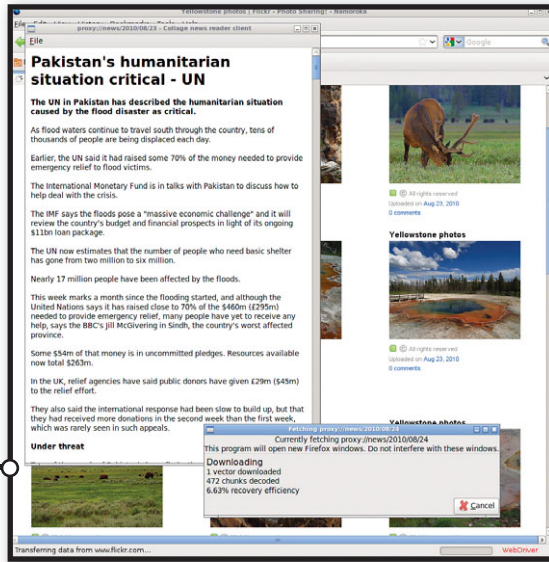
Also advantageous is the double duty that the scanners and cameras do in creating a map. Zakhor explains, "In essence, we use the laser scanners both for localization and to construct the 3D point cloud, or a set of points, each of which can be represented by their X, Y, Z coordinates in 3D space. It is a dual use kind of a thing. Ditto with the camera: We use it for both localization and for texture mapping (adding color and texture to the triangular meshes that are generated from the 3D point cloud) the resulting 3D models."

The team is now working to improve their models' photorealism and visual quality. ■



Professor Avidesh Zakhor of the University of California, Berkeley has led her team in developing a sensor-laden backpack that can record and create 3D mapping of interiors on the fly. Zakhor's team previously invented the exterior mapping technology now licensed by Google for its Google Earth mapping software.

Researchers at the Georgia Institute of Technology have created Collage, an anticensorship application that lets people hide and retrieve potentially sensitive content and messages in user-generated sites such as Flickr and YouTube.



This Picture
Is Worth A Thousand Words . . .
Plus A Few Encrypted Ones

Superheroes come in many packages, and Sam Burnett, of the Georgia Institute of Technology, wears his cape proudly. Burnett is part of a team of developers who have created Collage, software that offers users in media-censored countries a way to view hidden news and information via uncensored Web sites.

Typically, users who live in censored countries have to gather restricted information online by connecting through proxies, which are not difficult to detect by the censoring governments. Instead, the Collage team has explored burying information in more unlikely places.

“Collage works by hiding small amounts of censored information inside user-generated content (for example, photos on Flickr or videos on YouTube),” explains Burnett. “Users in countries with censored Internet access download this content and extract the messages hidden inside. This works because it is difficult to tell whether a given user is using Collage or is simply browsing popular Web sites.”

Collage has dual functionality: One layer lets the user embed content in

a “drop site,” and another layer creates a “rendezvous mechanism” for users wanting to post and recover messages on the drop sites. In order to pick up concealed messages and content, a user has to perform a series of tasks, such as “fetching a particular URL or searching for content with a particular keyword.”

Actually distributing Collage was the real sticking point for the team—how to get it in the hands of the multitudes who need it, and how to have photos available to hide the content in. “Only a small amount of space is available in each photo,” says Burnett, “so we potentially require a lot of photos.” Recently, Burnett and his team have created a service where Flickr users can contribute their photos specifically for Collage content.

Currently, the Collage demo app runs well on Ubuntu Linux, but the team is working on supporting other systems. They also are hoping to release Collage as open source soon and are working on expanding their compendium of plug-ins to include other media-sharing sites besides Flickr and YouTube. ■

Multicores Marry Virtualization & Spawn New Smartphone Platform

eMuCo is not a new breed of Frankenbird, genetically modified for your questionable consumption. Instead, it's short for “Embedded Multi-Core Processing for Mobile Communications,” a software platform brought to you by a European consortium of academics and mobile companies. Coordinated by Drs. Attila Bilgic and Maria Elizabeth Gonzalez at Ruhr-University Bochum in Germany, the project combines, for the first time on smartphones, multicore processors with embedded virtualization.

eMuCo has utilized multicore system-on-a-chip-architecture, with an eye on users' greater demand for computational efficiency and power on their phones. Virtualization, on the other hand, separates cell phone application software from hardware, with the effect of cutting off the software's ability to command or even access the underlying hardware system. This makes for greater security when downloading applications to a phone.

The result of bringing the two technologies together in one package, explains Bilgic, is that smartphone users get more of what they want—customization of their phones via application downloads, security of private information stored on their phones, and protection against viruses and/or Trojan horses.

A project press release touts both the safety and versatility of the consortium's development: “The system has been designed with modern security principles from the ground up, enabling fine-grained access and communication control between components, bringing the control mechanisms to a new level. A broad range of applications is supported by different virtualization techniques ranging from language runtimes up to whole operating systems.”

The research team anticipates that with iPhones and Androids already forging the way in marketing applications, other companies could quickly develop apps and sell them to their users, or create new business models around the new platform. ■

If you're looking for products or information to help you at your job as a data center manager or IT professional, where do you go? [Processor]

In *Processor*, you'll find:

- 60+ new product releases in every issue
- In-depth product coverage
- News, information, and trends in the constantly changing IT industry
- Insight from industry insiders
- Upcoming IT events
- And much more



Processor is the most comprehensive source of information for data center managers and IT professionals, and it's produced by the publishers of CPU magazine. Put our industry experience to work for you.

Visit www.Processor.com or call (800) 819-9014 to sign up for your free subscription to *Processor*.

HighSpeed PC

Specialty Computer Hardware

HSPC Tech Station Fast-Access Computer Case!

"The Tech Station (patent pending) is a hardware workbench bringing PC parts within easy reach yet keeping them safe and secure. Perfect for PC builders, upgraders, and overclockers."



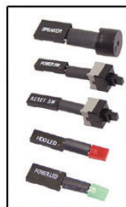
- New! Secure rubberized motherboard standoffs
- HDD storage/cooling rails for up to two 3.5" hard drives
- AGP/PCI card supports brace w/ thumb screws (no loose add-in cards!)
- ATX Control Kit (mini power/reset switches, LEDs, speaker)
- 120mm fan for ideal cooling
- Anti-static and non-conductive!
- Standard, Large, and Custom sizes/colors available



Hard Drive Storage Rails



AGP/PCI Support Brace



ATX Control Kit

www.highspeedpc.com

BEING COMPETITIVE STARTS WITH BEING PRODUCTIVE. HERE'S YOUR EDGE.

QuickCAST Mobile is an easy to use, all-in-one package that allows anyone to start automating tests in minutes with no special technical skills. It has a affordable price, powerful features and impressive support resources. With QuickCAST Mobile, you'll test more, test faster and lower costs at the same time!

IDEAL SOLUTION FOR:

- SYSTEM BUILDERS
- COMPUTER REPAIR SHOPS
- RECYCLING CENTERS
- MOBILE ONSITE TECHNICIANS

MADE IN THE USRI

www.uxd.com

GET MORE INFO: 1-888-722-3734

www.uxd.com EMAIL: SALES@UXD.COM

Look For *CPU* At These LAN Parties Across The Nation—& Beyond!

12.17.10

Intel LANFest Atlanta - Atlanta, GA
lanfest.intel.com

12.18.10

Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

SLAGG - Bradenton, FL
www.slagg.org

South Princeton LAN II - Princeton, IL
southprincetonlan.wordpress.com

01.02.11

Gam3r5 - San Jose, CA
www.meetup.com/santacruzgam3r5

01.08.11

LAN Lordz - Wichita, KS
lanlordz.net

01.13.11

MagFest - Alexandria, VA
magfest.org

01.14.11

LANWar - Louisville, KY
www.lanwar.com

01.15.11

Gaming Northwest LAN -
Vancouver, WA
www.gamingnw.com

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org

WV Gamers - Eugene, OR
www.wvgamers.com

01.21.11

Kansas LAN - Lyons, KS
www.kansaslan.com

01.28.11

JANLAN 2011 - Eugene, OR
www.euglan.com/janlan-2011

02.05.11

Carolina Games Summit - North Carolina
www.CarolinaGamesSummit.com

02.11.11

PDX LAN 17.0 - Portland, OR
www.pdxlan.net

02.12.11

LAN Lordz - Wichita, KS
lanlordz.net

WV Gamers - Eugene, OR
www.wvgamers.com

02.19.11

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org

02.25.11

FITES Frag Infinity Tournament - York, PA
www.fites.net

03.04.11

Pittco's IRON STORM XII LAN Party -
Pittsburgh, PA
www.pittco.org

03.11.11

PAX East - Boston, MA
www.paxsite.com/paxeast

03.12.11

LAN Lordz - Wichita, KS
lanlordz.net

WV Gamers - Eugene, OR
www.wvgamers.com

03.19.11

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org

RIT Gaming Society Expo - Rochester, NY

03.27.11

St. Cloud Gamers - St. Cloud, MN
No web address

04.02.11

Bring Your Own Computer 12-hour LAN Party -
Penn College

04.09.11

LAN Lordz - Wichita, KS
lanlordz.net

04.16.11

LAN OC V8.0 - Ohio City, OH
lanoc.org

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org

04.23.11

WV Gamers - Eugene, OR
www.wvgamers.com

05.13.11

Project X: Redemption - Calgary, AB, Canada
www.ProjectxLAN.com

05.14.11

LAN Lordz - Wichita, KS
lanlordz.net

05.21.11

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org

WV Gamers - Eugene, OR
www.wvgamers.com

06.01.11

HAM LAN - Hamilton, OH
www.ham-lan.com

06.11.11

LAN Lordz - Wichita, KS
lanlordz.net

06.18.11

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

Oklahoma Gamers Group -
Oklahoma City, OK
www.okgg.org

WV Gamers - Eugene, OR
www.wvgamers.com

07.01.11

LAN Kansas 2011 - Wichita, KS
www.lan-kansas.com

07.09.11

LAN Lordz - Wichita, KS
lanlordz.net

07.16.11

NGC's LAN-A-GEDDON - Greenville, TX
www.networkgamingclub.com

Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org

cpu®

Would you like us to help promote your next LAN?
Give us a call at 1.800.733.3809
We'll be glad to consider your event



OPTIMIZABLE & OPTIMALLY PRICED LOGISYS IKONIK OPTIMUS 1200

If you think you see design cues from certain robots in disguise in this value gaming case, you're not alone. We're guessing that fans of a certain sci-fi/action franchise are a *prime* audience for the Optimus 1200.

This steel chassis positively addresses a couple of points of recent interest from enthusiasts. One is support for the mounting bolt patterns of 2.5-inch SSDs, so installing a flash disk no longer means a decision between using only one screw or double-sided tape. The other wise move is sufficient clearance for the longest graphics cards sold today, such as the oaken two-by-four that is the 330mm Radeon HD 5970.

The Optimus 1200 checks off plenty of other boxes on gamers' criteria lists. The seven-slot case is finished in black inside and out, which radically improves the aesthetics should you choose to show off your hardware with the optional side panel window. Logisys strategically lights the chassis with built-in, crimson LEDs.

Watercooling is no problem in this Ikonik case, which has plenty of traditional ventilation potential as it is. There's provision for lots of optional 120 or 140mm fans on the side, top, front, and rear. Cable management channels under the mainboard and elsewhere keep wiring out of the path of the airflow, while the bottom bay for a power

supply (not included) ensures cooler air into this critical component.

Tool-less locking mechanisms make it simple to add or remove storage drives. With five internal bays and one accessible from without, you'll have plenty of leeway in the positing of your 3.5-inch drives. There's even room for up to four burners, a reservoir, a fan controller, or whatever else you'd care to install. Anti-vibration enhancements keep it all hush-hush.

To top it all off (literally), Logisys situated ports up top for making handy connections to eSATA and USB 2.0 devices. In other words, it's fair to say that there's more to the Optimus 1200 than meets the eye. ■

Q&A With Rob Powers

NewTek's VP Of 3D Development Makes A Scene

Rob Powers, vice president of 3D Development at NewTek (www.newtek.com), was the creator and supervisor of the virtual art department for "Avatar." He has the same job now on the Spielberg/Jackson project, "Tintin," and was the lead creature designer on Cameron's "Aliens of the Deep." A modern master of 3D animation, Powers knows how to make pixels dazzle our imaginations.

Q What is a virtual art department, and what is its significance for future filmmaking?

RP The VAD creates the digital assets for a film's virtual production. The environments, characters, and vehicles all begin their digital life in the virtual art department, where an immersive discovery process, such as virtual location scouting, influences the evolution of the design.

Q A few years ago, we heard a lot about CGI destroying the art of filmmaking. Now, perhaps after "The Lord of the Rings" and "Avatar," you don't hear those criticisms so much. Have we been able to put the humanity back into pixels?

RP The potential of human touch was always at the center of the most impactful films audiences have enjoyed. However, we did have a learning curve. The digital evolution of filmmaking was long hindered by overly technical interfaces and off-putting workflows.

Virtual filmmaking, as pioneered by James Cameron and his team, was the big step to change all of that. The filmmaking of CG-heavy films and animated projects could more closely resemble live-action filmmaking, where everything is more interactive and intuitive. In the two decades before this—the "Visual Effects Dark



Ages"—any filmmaker who attempted CG was forced into a workflow that was in many ways alien to the filmmaking process. It entailed weeks or months of waiting to see their creative visions for a particular shot in real time, which obviously stifled creativity.

Q Do you foresee a day when we might idolize purely digital actors just as we now idolize real ones?

RP I won't rule that out. Disney proved as far back as Mickey Mouse how a stylized, fully animated character could be very appealing.

However, with more photo-realistic characters, like the ones in "Avatar," it was clearly the actors' performance that moved audiences. The art of acting takes a lifetime to perfect. I don't see any way around that, and I don't think there should be. Performance-capture technology is simply a liberation from the constraints of the actor's physical body, sort of like character

makeup on steroids. Actors are freed to play roles that they would never physically be considered for in the real world.

Q Where did your digital video inspiration and motivation come from, and what was your big break?

RP I was formally trained at the USC School of Cinematic Arts and attended graduate school at the American Film Institute. I began working in television visual effects in the early 1990s and worked shows like "Ally McBeal," where I was the lead animator of the famous 3D dancing baby. Originally, the baby danced from a motion capture file, but after its initial appearance, the baby became a regular "guest star" on the show. Those appearances involved quite a bit of hand-keyed character animation, which, interestingly enough, was all done by myself and a chap by the name of Raymond Pettit at Encore Hollywood under the guidance of the show's supervisor of VFX, Rick Kerrigan.

Q On your Web site (robpowers.com), you detail your pioneering work way back in 2005 on 64-bit animation under Windows. Now that multicore systems are heading to consumer desktops, what role do you think the home enthusiast has to play in tomorrow's filmmaking world?

RP It's staggering . . . how much computing power the average person has at their fingertips today. The coming decade is going to be a boundary-pushing time for moviemaking, and I predict the trend toward complete interactive and immersive software will continue to improve. The best software developers will move away from the overly complex workflows of the past toward "creative-centric," artist-friendly interfaces. This is the direction we're heading at NewTek with the evolution of LightWave 3D software, which I relied on daily in the VAD pipeline for "Avatar." The more common artist-friendly software becomes, the wider the door opens for artistic expression. Technology will no longer be the master. Instead, it will rightfully serve the creative individual. ■



SPARKLE
COMPUTER CORP
BEYOND GAMING

WORLD'S ONLY TRUE ONE SLOT...

...GTS450

Sparkle GeForce GTS450
1024MB GDDR5 Native MiniHDMI Port
SXS4501024D5SNS

Uniquely designed, and unlike any other, the Sparkle® GeForce® GT S 450 is a true one-slot graphics card that delivers unprecedented performance in the most compact design.



...LOW PROFILE

Sparkle GeForce GT430
1024MB DDR3 Low Profile Native MiniHDMI Port
SXT4301024S3LHS

Whether it's photo or HD video editing, Blu-Ray 3D™ movie watching or even the latest game titles with DirectX 11, Sparkle® GeForce® GT 430 is ready to take you beyond the game – it's your ultimate performance upgrade.



WHERE TO BUY



amazon.com

COMPUSA
THE COMPUTER SUPERSTORE

TigerDirect.com

MICRO CENTER
computers & electronics



www.SPARKLE-USA.com

© 2010 Sparkle Computer Corp. All Rights Reserved. All other trademarks, copyrights and logos are property of their respective owners.

"This is simply one of the fastest PCI Express based SSD solutions we've tested to date and its price/performance ratio literally shatters anything we've seen thus far." — **Hot Hardware**

"It simply rocks. It's hands-down the fastest SSD we have used and its elegant simplicity in use and installation makes it all the more appealing for users of all levels." — **Legit Reviews**

"...the fastest single SSD product you can install in your system. It is almost inconceivable that it's also one of the easiest RAID products to install as well." — **Tweaktown**

BOTTLENECK, MEET YOUR NEWEST SIS

- Maximum Performance
Read Up to 740MB/s
Write Up to 720MB/s
4KB Random Write: Up to 120,000 IOPS

- Available in: 100GB - 960GB



When it comes to your desktop, solid-state storage shouldn't be limited by the SATA interface. Using PCI-Express, the OCZ RevoDrive X2 SSD eliminates the SATA bottleneck making it the fastest SSD on the market. Unlike competing PCIe SSDs, the X2 is bootable to provide an even more responsive PC experience compared to traditional hard drives. Delivering over 700MB/s and up to 120,000 IOPS, say bye-bye to bottlenecks and hello to high performance.

The SandForce Driven™ Logo is a trademark of SandForce, Inc.

RevoDrive X2

BOOTABLE PCIe SOLID STATE DRIVE

OCZ
Technology
ocztechnology.com

Available at:

